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A MANUAL  
OF  
MEDICAL JURISPRUDENCE

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**This Little Work**

**IS DEDICATED WITH PERMISSION**

**TO**

**C. SABAPATHY IYAH, ESQ.,**

**BARRISTER-AT-LAW,**

**IN GRATEFUL REMEMBRANCE OF MANY ACTS OF KINDNESS.**



## PREFACE.

**I**N writing the following pages, I have endeavoured to place before the reader the leading facts of Medical Jurisprudence in a concise form. The object of this Manual is to supply a cheap hand-book, in as popular a language as possible, for the legal and the medical practitioner alike, and to help students going in for examinations.

I have to express my great indebtedness to the Standard Manuals of Taylor, Ogston, Lyon, Husband, Gribble and others, for the valuable aid I have received from them whilst preparing this compilation.

A. Y. N.



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# A MANUAL OF MEDICAL JURISPRUDENCE.

## INTRODUCTION.

FORENSIC, legal, or State medicine, or, as it is best known, **Medical Jurisprudence**, is 'that branch of medical knowledge which treats of the connection between law and medicine, and deals with cases connected with the administration of justice, and with questions involving the social duties and civil rights of individuals.'

It may be defined to be 'that science which teaches the application of every branch of medical knowledge to the purposes of the law.'

'Traces of this science are found in the Jewish law ; among the Egyptians according to Plutarch ; and among the Romans as early as the times of Numa Pompilius.'

**The Medical Jurist** should, by his knowledge, experience and skill, be able to elucidate any difficult medico-legal question—by representing the subject clearly to the judge, and enabling a jury to arrive at a just conclusion. He may be required to determine whether such and such a death was natural or violent, and thus 'aid the law in fixing on the perpetrator of a crime, or in rescuing an innocent person from a falsely imputed crime ;' so that the duties of the medical jurist are separate from those of the medical

practitioner, whose duties are to attend on the sick and the wounded. The main difference in the two kinds of practice is that facts which are of no significance in a medical or surgical point of view become often of the utmost value in Medical Jurisprudence. The non-observance of these facts is a great evil, as professional ignorance, if not bias, is generally imputed to it. The primary duty of a medical jurist, therefore, is to train the faculty of close observation of medical and moral circumstances. A learned Scotch judge on one occasion remarked that 'a medical man, when he sees a dead body, should notice everything.' It is well for the medical jurist to act up to this advice, for one art of counsel for the defence consists in trying to find out what the medical man omitted to do, and in placing it before the court in such a way as to obtain the benefit of a doubt to the accused.

## PART I.

### MEDICAL EVIDENCE.

All medical evidence may be classed under three heads:—

- A.** Documentary.
- B.** Oral.
- C.** Experimental.

#### CHAPTER I.

### DOCUMENTARY EVIDENCE.

Documentary evidence includes written opinions, medical certificates and medical reports.

*Written opinions* generally relate to civil questions.

*Medical certificates* generally relate to the state of health of a person, or to vaccination, or to death.

Health certificates are required in such cases as when a person wants to enter or retire from Government service, or when he desires to have his life insured, or when he wants to absent himself from a court of law on the plea of ill-health. In the case of those entering Government service, the fact that the person has been vaccinated or has had small-pox is also stated.

Vaccination certificates should be produced by persons going in for Government examinations.

Death certificates are required in cases of violent death, or when death has taken place under suspicious circumstances.

*Medical reports* are documents given in obedience to an order from the public authorities, and relate chiefly to criminal cases.

The reports are the written down results of the examinations made by the medical practitioner in regard to symptoms, appearances after death, or the results of an analysis.



**Dying Declarations.**—When a medical man is called to see a person who is dying either from the effects of a poison, or from those of a wound, the dying person may tell him the circumstances under which the poison was given, or the wound inflicted. He may also tell him the person or persons who wounded or poisoned him. These statements or *dying declarations*, as they are called, may become of extreme value in a case that may subsequently turn up. These statements are accepted because the law presumes that a dying person will speak the truth. But the person must be under the belief that he is actually on the point of death, and that there is absolutely no hope of recovery. The medical man should, therefore, be very careful in observing and noting down the exact state of the patient, and should write down all the statements made by the dying person, and see them signed and witnessed. He should not make any suggestions or comments of his own. If possible, a magistrate should be sent for to take the dying declaration.

IN CASES OF DEATH, the time at which the person was first seen, the circumstances under which the practitioner was first called, the time of death, the hour, the day of the week and the month should all be stated, in words, not in numbers.

The following points should be noted when a body is found dead :—

1. The exact time when the body was first found.
2. Presence of *rigor mortis*, i.e., whether the body was rigid or not ?
3. Temperature. Was the body warm or cold ?
4. The exact time of death as far as could be ascertained.
5. The soil or surface on which the body was found.
6. Presence of decomposition.
7. The attitude and position of the body when found.
8. The presence of any foaming at the mouth, any vomited or evacuated matter, or any marks of blood on or near the body. If there was blood, it should be noted whether it was dry or liquid, and the exact position and site of the marks of blood. Secure all vomited and evacuated matters separately in clean vessels.
9. Note the external appearance as well as all marks of violence on the body, and also if there are any signs of a struggle having taken place. If covered by clothes or not ?
10. Any insurance on his life ?

11. Note statements voluntarily offered, and all other suspicious circumstances.

12. When, where and in whose society was the deceased last seen alive?

13. Any smell of liquor about the body?

14. Preserve and note the position of all articles found near the body, such as paper packets, bottles, spilled liquids, or weapons.

15. Did he show any peculiar symptoms? If so, when and how long did they last?

16. How long after partaking of any meal, food, drink, or medicine did the symptoms come on?

17. Did the symptoms continue without intermission in the same state as first observed, or did they come on at intervals, or did they gradually develop?

All these points should be carefully noted, and the paper duly attested by the local authorities; and the body, as well as the preserved articles, should be sent to the nearest hospital, for purposes of more careful examination.

If a medical man is summoned by a constable to see a dead body found on the public road, he should not only certify to the fact, but also state the probable cause of death, at the same time suggesting a more careful examination by dissection.

## FORM OF MEDICAL REPORT.

Place of Examination.

Date.

1. Names of persons who identified the body.

### INSPECTION.

2. Appearance of the body, noting marks of injuries, scars, ulcers, &c.

3. Development of the body—well or ill fed.

4. Height (measured).

5. Age (guessed).

6. Sex. The finding of this may be difficult in cases where putrefaction has far advanced.

7. Color of hair and eyes (if possible).

8. Condition and position of the tongue.

9. Condition, number, arrangement and peculiarities (if any) of the teeth.

10. Presence or absence of *rigor mortis*, putrefaction, &c.

11. Condition and contents of the natural openings of the body.

12. Condition and contents of the hands, nails, &c.

13. Condition of the neck, noting external appearance, unnatural mobility, &c.

### DISSECTION.

14. Condition of the bones of the skull, the membranes and sinuses of the brain, the brain substance and the lateral ventricles.

15. Position of the heart, lungs, &c., on opening the chest. Condition of the lungs, pleura, larynx and trachea, of the heart, the large arteries and veins and the pericardium; and of the œsophagus.

16. Position of the organs on opening the abdomen, and the condition in which the stomach, the large and small intestines, the liver, the kidneys, the bladder and the spleen are found. Contents of the stomach and duodenum and of the bladder. Condition of the abdominal arteries and veins.

17. Condition of injuries (if any), and a careful description of their appearance, &c. Note if any blood vessels have been injured in connection with them. Note if any bones have been fractured.

18. Conclusions as to the cause of death arrived at from the medical evidence obtained, written in plain, untechnical, unexaggerated language, without comments or digressions and the reasons on which the conclusions are based.

*Signature.*

When a liquid or solid is sent to a medical officer in charge of a hospital or dispensary, he should note:—

1. When, from whom and how received?

2. In what state was it received, whether exposed or preserved in any way?

3. (If more than one substance is received, each should be separately and distinctly labelled.) The size, appearance, capacity and quantity of the vessel or vessels.

#### 4. Physical characters of the substance or substances.

If the medical officer receives an order from a magistrate, Superintendent or Assistant Superintendent of Police, to send these substances to the Chemical Examiner, he should do so, observing the directions hereinafter given under the heading of Chemico-legal Examinations.

### RULES FOR DRAWING MEDICAL REPORTS.

The reports should be plainly and concisely written, stating the facts *seriatim*, so that they are easily understood by non-medical men. If technical terms are employed, their meaning should also be stated. His own observations should be kept distinct from information supplied to him by others, and his conclusions should be based on the former alone. Hearsay evidence is admissible only in the case of dying declarations, as a dying person is expected to speak the truth. Information supplied by the police should always be taken with great caution. No superlatives should be used in the report, as they partake somewhat of exaggeration. The report should not be encumbered with opinions, inferences, or comments; but should contain the bare facts and the conclusion drawn therefrom.

The reports, to carry any weight, should always be based on notes which no medical man can with impunity omit to take. The notes should be made at the time and on the spot, or 'as soon afterwards as possible,' and may be used by him in court only as a refresher to his memory, and not altogether to supply its place. These notes as well as copies of the reports may be placed in the hands of the counsel or the court. The medical man should be prepared to give a reasonable explanation of all alterations, interlineations, and all medicines prescribed by him to the deceased.

## CHAPTER II.

### ORAL EVIDENCE.

A medical man may be called upon as a common witness or as an 'expert' witness. In the first case he has only to relate facts which have fallen under his own observation, just like any other witness. But when he is called upon as a 'skilled' witness, he has to interpret facts which he has himself noticed, or those which have been observed by others. In England, the medical witness (just like any other witness) is not bound to give any testimony that would make him liable for prosecution.

But the law in India is different, and 'a witness shall not be excused from answering any question as to any matter relevant to the matter in issue in any suit or civil or criminal proceeding, upon the ground that the answer to such question will criminate, or may tend directly or indirectly to criminate such witness, or that it will expose or tend directly or indirectly to expose such witness to a penalty or forfeiture of any kind, provided that no such answer which a witness shall be compelled to give shall subject him to any arrest or prosecution, or be proved against him in any criminal proceeding, except a prosecution for giving false evidence for such answer.' (Sec. 132, Indian Evidence Act.)

**Professional Secrets.**—The law does not concede to the medical man the privilege of refusing to answer certain questions put to him, on the ground that the matters have come to his knowledge in his professional capacity. This question was raised by Mr. Caesar Hawkins, in the trial of the Duchess of Kensington, before the House of Lords, and decided by Lord Mansfield thus:—'If a surgeon was voluntarily to reveal the secrets, to be sure he would be guilty of a breach of honor and of great indiscretion; but to give that information in a court of justice which by the law of the land he is bound to do, will never be imputed to him as any indiscretion whatever.'

Advantage, however, has been taken of this fact, and the license of counsel has been much abused. On this subject, it may be well to consider what has been said by Erle, C. J. :—

'The law trusts the advocate with a privilege in respect to the liberty of speech, which is in practice bounded only by his own sense of duty; and he may have to speak on subjects concerning the deepest interests of social life, and the innermost feelings of the soul. The law also trusts him with a power of insisting upon answers to the most painful questioning, and this power is again only controlled by his own view of the interests of truth.'

The same high authority remarked on another occasion that 'the freedom of question allowed to the bar was a public nuisance, and the barrister who made such an imputation ought to be prosecuted. If a question had relation to the truth, he was most anxious it should be put, but to cast haphazard imputations at the suggestion of a person (an attorney) who might have no scruples as to what he did, was a degree of mischief that made him wish that a party should be prosecuted. He begged leave to say that in his experience, he had seen counsel to abuse their privilege, that he had cordially wished a power could be instituted that they might be prosecuted for a misdemeanour.'

Before leaving this subject of medical secrets, two important questions have to be considered :—

1. If during the attendance of a medical man on a patient, he has reasons to suspect that the patient is undergoing slow poisoning, what course is he to adopt ?

2. If the suspected perpetrator of the crime be also a medical man, is it breach of professional etiquette to reveal his suspicion ?

There are great difficulties in answering these questions, for a medical man must not charge another with crime, on mere suspicion.

In such cases, the medical man should promptly confirm or throw away his suspicion, by medical observation and chemical analysis of the patient's urine, &c.

If his suspicion is corroborated by these investigations, Christison advises that the fact should be communicated to the patient at once, and the matter should be immediately reported to a magistrate.

**Quotation from Books.**—No witness is allowed to quote from books, or to quote the opinions of other medical men on the subject. But when a quotation is made by the examining counsel, the medical witness, before replying to a question based on it, should see that the quotation has been fully and fairly given, due regard being paid to the context.

The examination which the medical witness has to undergo consists of three parts,—The examination-in-chief, the cross-examination, and re-examination. The medical witness is allowed to be in court except under special circumstances, and hear the whole of the evidence of the case. This is but fair and necessary, as otherwise he will not be in a position to form a decided opinion of the case. If, however, he is excluded, the judge or counsel will have to read to the witness notes of the evidence before his opinion can be given.

As a **summary** of all that has been said about oral evidence, Sir W. Blizard's advice to medical jurists may well be quoted here :—

‘ Be the plainest man in the world in a court of justice ; never harbour a thought that if you do not appear positive, you must appear little and mean for ever after ; many old practitioners have erred in this respect. Give your evidence in as concise, plain, and yet clear a manner, as possible ; be intelligent, candid, open and just, never aiming at appearing unnecessarily scientific.

**State all the sources by which you have gained your information.** If you can make your evidence a self-evident truth ; thus, though the court may at the time have too mean or too good an opinion of your judgment, yet they must deem you an honest man. Never then be dogmatic, or set yourself up for judge and jury ; take no side whatever, be impartial, and you will be honest.

‘In courts of judicature, you will frequently hear the counsellors complain when a surgeon gives his opinion with any the least kind of doubt, that he does not speak clearly ; but if he is loud and positive, if he is technical and dogmatic, then he is allowed to be clear and right. I am sorry to have to observe that this is too frequently the case.’

## CHAPTER III.

### EXPERIMENTAL EVIDENCE.

Under this heading several questions of great importance have to be considered, such as examination of the living and the dead, modes of sudden death, phenomena after death, and exhumations.

#### EXAMINATION OF THE LIVING.

It is not often that the presence of a medical man is necessary for the identification of the living. But he may be consulted with regard to the nature and presence of certain marks on the body, such as *nævi materni*, tattoo marks, scars, &c., or with regard to the organs of reproduction in cases of doubtful sex, or with regard to deformities either congenital or acquired, or with regard to the mental condition of a person.

*Scars.*—Do they ever disappear ? ‘Can their age be stated ?

In reply to these questions, Professor Casper says that ‘scars occasioned by actual loss of substance, or by a wound healed by granulation, never disappear, and are always to be seen on the body. But the scars of leech bites, or lancet wounds, or of cupping instruments may disappear after a lapse of time that cannot be more distinctly specified, and may therefore cease to be visible on the body. It is extremely difficult, or impossible, to give any certain or positive opinion as to the age of a scar.’

The white color of ordinary scars is probably due to the fact that the tissue formed in a scar is never changed into true skin. Some scars are pigmented.

The scars which are indistinct may be made plain and visible by slapping the part with the hand, when the scar becomes white, while the surrounding parts are red ; or by washing the scar ; or by a change of temperature of the part.

The shape of a scar depends on the nature of the wound which caused it, on the way in which that wound healed, and on the part of the body where the wound was inflicted. If the wound was an incised one and healed by 'first intention,' a white linear scar will result. Gunshot wounds leave a depressed scar which is adherent to the tissues underneath. Wounds healing with more or less discharge of pus will result in an irregular scar. Scars from burns are large, irregular, and often cause deformity.

*Tattoo Marks.*—Do they ever disappear? Can they be artificially effaced? These questions led to a good deal of discussion in the noted Tichborne case. The experiments of Tardieu and other eminent scientists go to prove that tattoo marks may become perfectly effaced during life, and that the coloring matter used may be found in the lymph glands after death. Marks with some colors as Indian ink, powdered charcoal, &c., are more permanent than others made with washing blue or vermilion.

They may be made to disappear artificially by applying the actual cantery, or caustics to the skin, or by excision. But all these leave scars which must be more or less visible. The plan adopted by a prisoner Aubert and communicated by him to Tardieu is more successful, though even here the original designs were traceable. Aubert adopted the plan of alternately applying strong acetic acid, potash and dilute hydrochloric acid.

In connection with tattoo marks, two rare but interesting and important facts should be borne in mind ; viz., that syphilis can be transmitted by this process, and that some cases are recorded in which the operation proved fatal by reason of the after consequences.

*Other Means of Identification.*—Identity may also be proved by means of photographs ; by noting the arrangement and formation of the teeth ; by noting whether a person is right handed or left handed, or ambidextrous ; by observing the color of the hair ; by noting certain marks peculiar to those professions ; or by taking casts of suspected foot-prints, and comparing them with the foot of the suspected individual.

[Casts of foot-prints may be taken with wax. The following plan suggested by Hongolin is preferable :—'The foot-print or the mark is gradually heated by holding over it a pan contain-



ing burning charcoal, and then powdered stearic acid is sprinkled into the foot-print so heated, and allowed to cool. From the mould so taken, a plaster of Paris cast can be made. The stearic acid may be powdered by dissolving it in spirit, and then pouring the solution into water.']

The hair may be dyed for purposes of fraud. Solutions of chlorine are used to make the hair lighter, and of silver nitrate or lead acetate to darken the hair. These frauds are easily detected by carefully examining the hair, by allowing the hair to grow, or by chemical tests.

False teeth, which may be used for practising deception, may be easily found out by an examination of the mouth.

*Professional Marks.*—In copyists, there will be a corn at the end of the little finger and a groove at the end of the middle finger of the right hand.

In photographers, the fingers are blackened or yellowed by silver nitrate or potassium bichromate.

In violinists, there will be corns on the tips of the left hand fingers.

In tailors the index finger of the left hand is roughened by the constant pricking of the needle.

In stone masons there will be flattening of the tips of the thumb and index finger of the left hand, owing to the constant picking of the bricks.

Shoemakers have more or less depression of the lower portion of the breast-bone due to the constant pressure of the *last* (wooden mould of the foot on which boots and shoes are made) against the bone.

Smokers of pipes have their cutting teeth (incisors) and eye-teeth (canines) more or less worn out by the mouth-piece.

## EXAMINATION OF THE DEAD.

The *post-mortem* appearances which are found in cases of poisoning, criminal abortion, infanticide, suffocation, &c., will be given under the respective headings. The several points which should be noted when a body is found either by a medical man, a magistrate or a police officer, have been already mentioned. But in this place some points will be dealt with which are of importance in ascertaining the time which may have elapsed since death, and also in determining the age, sex, &c., for purposes of identity when decomposition has far advanced, or when the skeleton alone is found.

**Time of Death.**—There are considerable difficulties in ascertaining the time which may have elapsed since death. It should be determined by observing the cooling of the body, the age of the person, the moisture and warmth of the surrounding atmosphere, the stillness or otherwise of the air in the place, the nature of the suspected cause of death, and the presence or absence of *rigor mortis*. It should not be forgotten that in certain cases as cholera, rheumatic fever, &c., there is increased heat of the body surface after death. Cooling of the body is slower if the body is fat and covered by clothes, or otherwise unexposed, as when it is buried in a refuse heap. Bodies immersed in water cool more readily than in air.

The changes which a body successively undergoes from the time of death may be utilized to ascertain the same point. These changes are more rapid in hot than in cold and temperate climates, and in summer than in winter.

They may be divided into four stages as adapted to this Presidency :—

**1st stage.**—From a few minutes to three hours or more.—Animal warmth more or less present; the voluntary muscles are generally or partially relaxed; muscles contract if they are stimulated.

**2nd stage.**—From two to twenty-four hours.—Body quite cold; *rigor mortis* well-marked; muscles do not contract when stimulated.

**3rd stage.**—During this stage, which lasts only for a few hours in this Presidency, *rigor mortis* has disappeared and the body is quite cold.

**4th stage.**—Putrefaction commences. It shows itself first by a bluish-green discoloration of the skin over the abdomen.

These are only rough guides, and great care must be taken before any decided opinion is given.

If the skeleton alone is available, the following may be of use in determining the sex and the age of the person :—

**Sex.**—‘In the female pelvis, all the bones are lighter in structure, and have the points for muscular attachments much less developed. The iliac bones are more spread out; hence the greater breadth which is observed in the female figure, and the peculiar side to side movements which all females have in walking. The tuberosities of the ischia are lighter in structure and further apart, and the rami of the pubes also converge at a much

less acute angle . . . . . The obturator foramina are more triangular in shape. The whole cavity of the female pelvis is wider and less funnel-shaped than in the male, the symphysis pubes is not so deep, and as the promontory of the sacrum does not project so much, the shape of the pelvic brim is more oval than in the male.'

In addition to these differences in the pelvis, 'the thorax in the female is deeper than in the male, the sternum is shorter and more convex, the ensiform cartilage thinner and ossified later in life. The cartilages of the ribs are larger, and the ribs smaller than in the male.'

*Age*.—This can be determined by an examination of the teeth, of the shape of lower jaw, of the ossification of bones and of the stature. The eruption of the teeth is very important in determining the age of an individual.

The temporary set, or milk-teeth as they are called, appear during the first two years of life. They consist of two incisors, one canine, and two molars in each half-jaw, making 20 in all. They make their appearance through the gums in five groups, in the following order:—

- 1st group—2 lower central incisors—6th—8th months.
- 2nd „ 4 upper incisors—8th—10th months.
- 3rd „ 2 lateral lower incisors and first 4 molars—12th—14th months.
- 4th „ 4 canines—18th—20th months.
- 5th „ 4 back molars—20th—30th months.

By the end of the second year, the milk teeth have all appeared, and begin to be replaced by the permanent set at the sixth year, and are completely replaced at the 12th or 13th year—the teeth being completed by the eruption of the wisdom teeth at about the age of twenty-one. When complete there are 32, there being two incisors, one canine, two bicuspid and three molars in the half of either jaw.

The permanent teeth appear in the following order:—

- 6th year—first molars.
- 7th „ two central incisors.
- 8th „ two lateral incisors.
- 9th „ first bicuspid.
- 10th „ second bicuspid.
- 11th-12th „ canines.

12th-13th year—second molars.

17th-21st „ wisdom teeth.

In the lower jaw, the ramus forms an obtuse angle in the full grown foetus, a right angle in adult life, and obtuse angle again in old age.

The ossification of the epiphysis of transverse and spinous processes of the vertebra does not commence before the 16th year. Two thin circular plates form on the body of the vertebra between the 20th and 30th years. The separate bones of the sacrum begin to unite at the 18th year, and the union is completed by the 30th year.

The first and second pieces of the sternum unite between the 25th and 30th years and the second and third before the 35th. Epiphyses of the ribs commence to grow between the age of 16 and 20 years, and are completed by the 25th year. The epiphysis of the clavicle begins to form between the 18th and 20th years.

To ascertain the *stature*, the bones must be laid out in position. The height thus measured and about 2 inches added to it for the soft parts will give the height of the individual.

No opinion as to height can be given when only a portion of the skeleton is obtained.

### MODES OF SUDDEN DEATH.

Sudden death may be natural or violent, and it is very essential that the medical jurist should determine the cause of death in a particular case, as on his decision may depend the innocence or guilt of a person.

Medical jurisprudence takes cognizance of all cases of violent death and such natural deaths which by their suddenness resemble those produced by violence.

The *maintenance of life* depends on the due performance of three organs which are mutually dependant on each other, viz., the brain, the heart and the lungs, and which have been properly termed the 'tripod of life.'

If one of them ceases to perform its function, the other two soon refrain from doing their work.

The three modes of sudden death are by syncope, asphyxia, and coma.

**Syncope.**—When the cessation of the action of the heart is the primary cause of death, death is said to take place by syncope.

*Causes.*—1. Deficiency of the quantity of the blood either in the system as when hæmorrhage takes place (death by anæmia), or in the quantity which passes through the heart, there being no actual loss of blood, as in fainting.

2. Effects of certain poisons which produce an arrest of the functions of the heart, its valves and blood-vessels (death by asthenia).

*Symptoms.*—The face becomes deadly pale, the circle round the eyes is livid, the lips are pale or black, and the limbs are cold. Giddiness and nausea are complained of, and he may actually vomit. His voice is lost. He faints, revives and faints again. He tosses continually from side to side; his head falls down in the bed; he raises his head at times suddenly, gasping as it were for breath with inexpressible anxiety: the tossing of the limbs continues; he draws long convulsive sighs; the pulse flutters and he expires.

*Post-mortem signs.*—These differ slightly according as death is due to anæmia or asthenia.

When it is due to anæmia, the heart may be almost empty; when it is due to asthenia, the heart contains a normal quantity of blood, as in asthenia the blood is simply arrested in its course. In both, blood is found in the large veins and arteries. The brain and lungs are not engorged with blood.

*Asphyxia.*—When the cessation of the action of the lungs is the primary cause of death, the term asphyxia is used. Death by asphyxia may be regarded as death due to a deficient quality of the blood. (It has been proved experimentally that the heart continues to beat for a few minutes after the lungs have ceased to act, and if the lungs be again made to act while the heart is beating, life may be prolonged.)

*Causes.*—1. Obstruction to respiration as in strangulation, drowning, hanging and suffocation.

2. Certain diseases as pneumonia, bronchitis, &c.

*Symptoms.*—At first the breathing is difficult, and the face becomes congested and livid. Convulsions soon commence, and are quickly followed by exhaustion and death.

*Post-mortem Signs.*—The right side of the heart and the great vessels will be full of black blood, whilst the left side will be found empty; and the whole arterial blood will be, as the

venous, of a dark color. All the abdominal viscera will be engorged with blood.

The lungs present nothing characteristic except in cases of drowning, when the air in the lungs will be churned up with blood, water, mucus, foreign matter, &c.

**Coma.**—When the primary disturbance of the functions of the brain is the cause of death, death is said to take place by coma.

*Causes.*—1, apoplexy ;

2, introduction of certain poisons into the blood ;

3, fracture of the skull ;

4, compression of the brain ; or,

5, destruction of its substance.

*Symptoms.*—The person falls into such a state of complete insensibility that it is impossible to rouse him. The breathing becomes slow, difficult and stertorous. The pulse is full, slow and labored. The person may be unable to swallow, to retain his fæces or urine. The pupils may be dilated or contracted ; but they are fixed and do not respond to light.

*Post-mortem Signs.*—The cavities of the heart contain more or less blood. The lungs, the brain and its membranes are all congested.

## PHENOMENA AFTER DEATH.

**1. Entire Cessation of Respiration and Circulation.**—The heart may continue to beat for three or four minutes after the lungs have ceased to act. But if it is ascertained by auscultation that the heart has ceased to beat, and by observation (of the chest) that the lungs have ceased to act, then the person may safely be pronounced to be dead.

**2. Condition of the Eye.**—The lustre and gloss of the eye is lost soon after the death of a person. The cornea becomes collapsed and wrinkled. There is want of elasticity in the eyeball.

**3. Facies Hippocratica.**—This appearance, characterized by sinking of the eyes, hollowness of the temples, sharpness of the nose, dryness and harshness of the forehead, sallowness of the countenance and flaccidity and paleness of the lips, precedes death, and continues to be recognizable after dissolution. (The appearance was first described by Hippocrates, the Father of Medicine.)

**4. Cessation of Muscular Irritability.**—Though the muscles may be made to respond to mechanical and galvanic stimuli shortly after death, if any time has elapsed since death, the most powerful stimulus fails to produce any reaction.

### 5. The state of the Skin:—

(a) Peculiar waxy appearance with more or less livid discolorations here and there.

(b) Cooling of the surface. The normal temperature of a living person in health is  $98.4^{\circ}$  Ft. The time taken for the body to cool is from 15 to 20 hours, but it may be modified by several circumstances which have been considered before, while discussing the time which may have elapsed since death.

### 6. Primary Relaxation of the Muscles generally.

**7. Flattening of the Muscles** on which the body had rested, occurring from their loss of elasticity.

**8. Hypostasis.**—Or *post-mortem* staining, or suggillation may be either internal or external. It is due to the gravitation of the blood in the capillaries to the most dependent parts of the body. It takes place when the body is cooling. External or cutaneous hypostasis, cadaveric lividity, or lividity after death, is first observed in from eight to twelve hours after death, gradually extending in size till the commencement of putrefaction. The length of time a body has been in a particular position in which it was found may be approximately determined by noting the position of cutaneous hypostasis. It forms after every kind of death, but less markedly in cases of death by hæmorrhage. It may be confounded with and mistaken for ecchymosis, the result of external injury. But they can be easily distinguished from each other, if the following facts be borne in mind:—

1. Ecchymosis may be raised above the surrounding surface which hypostasis never is.

2. When an incision is made into the part, only a few small points of divided arteries will be seen in hypostasis; whereas coagulated or effused blood will be found in ecchymosis.

Internal hypostasis may be mistaken for congestion or inflammation of the lungs, brain, kidneys or intestines. In the intestines, however, it is easily discovered, as the redness of inflammation is continuous, while that of hypostasis is interrupted. Hypostasis about the neck is liable to be mistaken for the marks of a cord, or the pressure of the fingers, &c.

**9. Rigor Mortis or Cadaveric Rigidity.**—When a person dies, the muscles of the body undergo certain remarkable changes, which are of great importance from a medico-legal point of view. At first, the muscles become flaccid (primary relaxation), though they contract on stimulation. This stage is called ‘the stage of muscular irritability.’

[But muscles which were contracted by the person at the moment of death, as when he holds a dagger or a pistol in his hand, do not get relaxed. To this phenomenon, the name of ‘cadaveric’ or ‘muscular spasm’ is given; and it should not be confounded with ‘cadaveric rigidity.’ This is of great importance, as a weapon firmly held in the hands of a dead body (due to cadaveric spasm) points to suicide, while a weapon loosely placed in the hand points to homicide (the instrument being placed in the hand by others for the purpose of deception.)]

Then comes the stage of cadaveric rigidity, in which the muscles are rigid and incapable of contraction on stimuli. It comes on within a few hours after death. It disappears sooner in summer and hot climates than in winter and cold climates.

It is said not to occur at all, or pass off rapidly in cases of narcotic poisoning, while in strychnia poisoning it lasts for a long time. It is slight and disappears soon in infants. It always comes on before putrefaction. It begins in the muscles of the lower jaw and the back of the neck, gradually passing on to the muscles of the face, front of the neck, chest, upper extremities and, finally, to the lower limbs.

It comes on rapidly after violent exercise, and disappears soon.

In persons of vigorous health, the rigidity is very strongly marked and lasts a longer time.

It is said to be caused by the coagulation of the fibrin of the muscle.

The rigidity passes off, the muscles again relax, have no power, and do not respond to stimuli, and the body begins to putrefy. This is the stage of the “commencement of chemical changes or putrefaction.”

**10. Putrefaction.**—“To those chemical changes which take place in dead animal matter, during which noxious gases are evolved, the term putrefaction is given.” It always results in the splitting up of organic into inorganic compounds consisting of water, ammonia and carbonic acid. It is in this transition stage that noxious effluvia are produced. In the dead body it comes on after cadaveric rigidity. The noxious gases are



produced not only in the abdominal and other hollow cavities, but also in the cellular tissue underneath the skin. Hence the peculiar crackling noise on pressure of a putrefied body, and the gaping of the margins of a wound when an incision is made. It begins sooner in parts which are wounded.

It may be confounded with gangrene or ulceration, or corrosion by irritant poisons. It is very necessary that the medical jurist should be able to distinguish it from these, as otherwise serious results are likely to accrue.

There are several factors which hasten or impede the progress of decomposition which must be briefly considered :—

1. *Age*.—The bodies of infants are said to putrefy sooner than those of adults.

2. *Sex*.—Females dying during or soon after child-birth are said to putrefy most rapidly.

3. *Condition of the body*.—Fat and flabby bodies putrefy sooner than lean ones.

4. *Effects of disease and poison*.—Persons who die of wasting diseases, as consumption, putrefy earlier than those who die suddenly while in health. In persons who die from the effects of toxic vapours, putrefaction rapidly supervenes; while in those who die of poisoning by phosphorus or sulphuric acid, it is greatly retarded.

5. *Air*.—Putrefaction sets in sooner when the body is exposed to the air.

6. *Earth*.—If the soil be dry and porous, putrefaction is much quicker than when the soil is close and compact unless, indeed, the latter soil contains moisture (which it generally does and which greatly assists the progress of putrefaction).

7. *Heat and Cold*.—Heat and cold considerably retard putrefaction, while moisture and warmth (70° to 100° F.) greatly promote the process.

8. *Water*.—Bodies immersed in water decompose less rapidly than those exposed to air; and twenty-four hours seems to be the earliest period when it begins to commence during the hottest weather. Putrefaction, however, may go on very rapidly even in bodies immersed in water. An interesting case is recorded in which putrefaction was so rapid that in 30 hours the gas generated was enough to float a woman weighing about 100 lbs. with a stone weighing 92 lbs. attached to her waist in a well about 12 feet deep.

The phenomena of putrefaction in the order in which it affects the different parts of the body should next claim attention.

**External Changes.**—At first the skin over the abdomen becomes discolored green. Noxious gases are soon developed and the eyeballs become soft. These changes take place within the first three days.

Within the next two days, greenish, irregular patches appear on several parts of the body, while the discoloration on the abdomen is more pronounced. At this time, a frothy fluid of a dark-red color escapes from the mouth.

During the next five days, the whole body becomes discolored, some parts being greenish-red, due to the presence of the decomposed blood in the cellular tissue. The surface veins of the body appear like cords. The sphincter ani gets relaxed and the abdomen is bloated, because of the generation of gases, the result of decomposition.

During the third week after death, decomposition has so far advanced and the whole body is so much bloated that recognition is rather difficult. The skin is peeled off in some places; the epidermis is raised into globules here and there; the nails and hair can be easily pulled off. The body is covered with maggots, and except a few brown patches here and there, the whole body presents a green appearance.

If the body is seen after three months have expired, the thoracic and the abdominal walls and even the bony covering of the brain have given way, owing to the distension of gas. At this stage, recognition even of the sex is difficult, except by the presence of the womb, or by the presence of hair which in females is confined to the neighbourhood of the generative organs, but in males extends up to the navel.

**Internal Changes.**—Some organs of the body resist putrefaction longer than others. The womb offers the most resistance and the wind pipe the least.

The following is the order in which the internal organs generally putrefy :—

1. The windpipe.
2. The stomach.
3. The intestines.
4. The spleen.
5. The liver.

6. The brain.
7. The heart.
8. The lungs.
9. The kidneys.
10. The urinary bladder.
11. The gullet.
12. The pancreas.
13. The diaphragm.
14. The blood vessels.
15. The womb.

**11. Saponification.**—This process takes place in very fat bodies which have been under water or buried in moist soil for over a year. In it, a peculiar white or yellowish substance of a greasy feel (formed by the combination of ammonia with the fat) called adipocere is formed.

## EXHUMATIONS.

It may occasionally be necessary to exhume a body long after its interment, for purposes of identification, or when it is alleged that the person had died from the effects of violence or poison. In such cases, the grave must be opened in the presence of the medical officer and one or more persons who can speak as to the identity of the body. The inspection of the corpse should be made after allowing some time for ventilating the body. In cases of suspected violence, the necessary examination should be made, as when it is alleged that a certain bone was broken during his life. In cases of poisoning, the stomach and the duodenum (after tying both ends) as well as the liver should be removed and transferred to clean, air-tight glass bottles for examination.

When the remains of the body are intermingled with the earth, some portion of the surrounding earth should also be preserved for analysis, as arsenic may be present in some earths.

## PART II.

### HANGING, STRANGLING, THROTTLING, DROWNING, SUFFOCATION, STARVATION, LIGHTNING, HEAT AND COLD.

#### CHAPTER I.

### HANGING.

Hanging is said to be the cause of death when the person dies by more or less suspension of the body by the neck, the constricting force being the weight of the body.

**Cause of Death.**—If the constriction be complete, death takes place by asphyxia. If, however, the ligature be somewhat loose, then some quantity of air may enter the lungs; death in this case being caused not by asphyxia, but by apoplexy produced by the interference with the circulation of the brain, on account of the compression of the blood vessels of the neck. But in a majority of cases death seems to take place by a combination of these two conditions. Out of 85 cases examined by Casper, 9 died of apoplexy, 14 of asphyxia, and 62 of both.

The process of death in hanging does not seem to be a painful one, as sensibility is soon lost, and life becomes extinct within four or five minutes. It is, on the other hand, said to be even pleasurable by those who have experimented on themselves! and by those who have been saved from death while attempting suicide by hanging.

Hanging is generally suicidal, but in rare cases it may be homicidal. Homicidal hanging must necessarily be very rare, as the force required to hang a person against his will must be enormous, or the victim must be in an extremely weak condition. Very often bodies of persons who have been otherwise murdered are hung up, to give an air of suicide to the case. Even persons who die a natural death are hung up in certain cases, with the malicious motive of charging some enemy with murder. So, it is very important to bear in mind the fact that the apparent cause of death is not always the real one.

6. The brain.
7. The heart.
8. The lungs.
9. The kidneys.
10. The urinary bladder.
11. The gullet.
12. The pancreas.
13. The diaphragm.
14. The blood vessels.
15. The womb.

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For death to take place by hanging, it is not at all essential that the body should be off the ground. Cases of death by hanging are on record where the toes and even the knees have been touching the ground.

**Signs of Death by Hanging.**—These are by no means uniform. In some cases there are no external marks at all. In other cases, the face is turgid, the eyes are bright and glaring, there is froth or even blood about the nostrils and mouth. The tongue is swollen (but it is not generally protruded from the mouth, nor is it bitten by the teeth), and there is flow of saliva from the mouth down the chin and straight down the chest.

The escape of urine and faeces may occur. Occasionally, turgescence of the genital organs may take place. In very rare cases, semen also is emitted.

The mark round the neck of the cord or other constricting material used is almost always present. The mark of the cord is generally over or on the thyroid cartilage, and its course is oblique. It may not be continuous, or may be found only on one side. It is dark yellowish-brown in color, and is hard and tough when an incision is made into it.

It may be asked if the mark of the cord cannot be produced in persons hung after death resulting from other causes. As an answer to this question, Casper says 'that any ligature with which any body may be suspended or strangled, not only within a few hours, but even days after death, especially if the body be forcibly pulled downwards, may produce a mark precisely similar to that which is observed in most of those hanged while alive.....The mark of the cord is a purely cadaveric phenomenon.'

When the 'long drop' is used, as in judicial hanging, the soft parts of the neck are greatly injured, the spinal ligaments and the hyoid bone are broken, and the spinal cord is considerably damaged on account of the fracture, or dislocation of the cervical vertebra. The internal and the middle coats of the great arteries of the neck (carotid arteries) are ruptured. The larynx, the trachea, the lungs, the vessels of the brain, the kidneys and the venous system are all more or less engorged with blood. The congestion of the stomach is very marked, and may be mistaken for the action of irritant poisons. The right side of the heart and the large blood vessels in connection with it are more or less distended with blood.

**Suicide, Homicide or Hung after Death?**—The history of the case from beginning to end and the concomitant circumstances, when coupled with the medical evidence gained as to the presence or absence of the external and internal signs of hanging just described, must generally be sufficient to assist one to arrive at a definite conclusion. As has already been observed, homicidal hanging must, for obvious reasons, be very rare indeed. In all cases, attention should be directed to the following:—

1. Any disposition in the individual to commit suicide.
2. The state of the dress. Is it torn, or has it been much interfered with?
3. Whether the hands and feet were tied, and if that could have been the work of the suicide himself? Any blood on the hands? Were the hands clenched?
4. Warmth of the body. Useful as a circumstantial evidence in judging of the time which may have elapsed since death.
5. Presence of injuries. The presence of great injury to the soft parts of the neck goes against suicide. The presence of several marks of injury and evidence proving that a previous struggle has taken place point to homicide. It must not be forgotten that persons who first cut or shoot themselves, finding their work inefficacious, may afterwards hang themselves. It should be noted whether these wounds are homicidal or suicidal, made by right-handed or a left-handed person.
6. Flow of saliva. The flowing of the saliva from the mouth down the chin and chest points to the person being hung during life; for the flow of saliva cannot take place after death.
7. The presence of any weapons or marks of blood in the room.
8. The presence of any marks of blood on the hands or body of the deceased, on the rope, &c.
9. The resemblance of the mark on the neck with the size of the cord produced.
10. The material of which the cord was made and its resisting power, especially considering the weight of the body.
11. The position of the body in relation to the surroundings.
12. Was the door locked from within or from without; and if from within, if there is any other means of escape.



It should not be forgotten that death may be due to strangling or throttling.

The cord and the knot should always be preserved.

The knot should not be untied or cut through.

Throttling, however, may be a suicidal act, as in the case of an epileptic, who tightly seizes his own throat and kills himself.

## CHAPTER II.

### STRANGLING AND THROTTLING.

In strangulation and throttling, death takes place from continued pressure made on the neck, without any suspension of the body.

When pressure is made with a stick, a cloth or other material, the word strangulation is applied. When pressure is made with the fingers, the word throttling is used. Death by these modes is either homicidal or accidental. In throttling the marks of the fingers on the neck furnish ample evidence as to the cause of death.

In strangling, the constricting mark is circularly round the neck, and not in an oblique position as in hanging. Besides both in throttling and in strangling, great external violence has to be used; the trachea and larynx are, therefore, considerably injured. This serves to distinguish strangling and throttling from hanging. The internal changes in these cases are the same as in hanging, as in all the three death is due either to asphyxia, apoplexy, or to both.

## CHAPTER III.

### DROWNING.

Death is said to take place by drowning, when respiration is interfered with by fluid or semi-fluid substances (water, muddy matter found in cesspools, dirty drains).

**Cause of Death.**—Death by drowning may be due to asphyxia, apoplexy, or to a combination of the two as in hanging, or to paralysis of the nervous system (neuro-paralysis).

It is not necessary for death to take place by drowning, that the whole body should be immersed in water. It is enough if the face or even the nostrils and mouth be immersed in water.

There is recorded an interesting case of a drunkard who died by falling on his face with his nostrils in the foot-print of a horse's hoof containing water.

Death by drowning takes place very rapidly (within four or five minutes). But if a person faints and falls into water in the fit, he may survive longer, for he does not attempt at respiration and thus fill his air-passages with water. As the heart continues to beat for a few minutes after the lungs have ceased to act, an attempt to restore the person to life should be made in all cases where the person has been in water for a short time.

A person found dead in water need not necessarily have died of drowning, for persons otherwise murdered may be thrown into water. It is, therefore, very necessary to find out if a person died in water, or if his body was thrown into it after death.

**Signs of Death by Drowning.**—In all cases of suspected drowning, the presence of sand, mud, &c., under the nails, and the presence of weeds, water plants in the hands confirm the suspicion. (It is advisable to compare the weed, &c., found in the hands with those found in the water where the body was found, with a view to ascertain if the body was drowned there or elsewhere.)

The goose skin (*cutis anserina*) present generally on the front of the body is an indication that the person has been recently living, though it is not exclusively a sign of drowning. The contraction and retraction of the penis is a very characteristic sign of death by drowning. The other external signs, as bloody froth about the mouth, discoloration of the face, &c., usually present in death by drowning, are met with in deaths from other causes also, and are, therefore, not characteristic of death in water.

The presence of vomitted matter in the trachea is a clear indication of death by drowning. The presence of mud or of any unusual quantity of water in the stomach is a sure sign that the person has died of drowning, for water cannot enter the stomach after death. It must be remembered, however, that water is not found in the stomachs of those who got drowned in a fainting fit. A large quantity of watery froth as if made with soap and water present in the trachea and lungs, with a spongy and distended condition of those organs, are characteristic of drowning. But the viscid froth of bronchitis, or the very small quantity of froth found in suffocation, should not be mistaken for the soapy froth of drowning. The other internal signs are those of asphyxia in general.

There being no difficulty then in deciding whether a person has died in water or been thrown into it after death, it remains to decide whether a given case of death is

**Accidental, Suicidal or Homicidal.**—This question is rather difficult of settling. For the fact of the hands and feet being tied does not go against suicidal drowning, as it may against suicidal hanging. Weights attached to the body are of no value in deciding between suicide and homicide, but it shows that it is not due to accident. Again, though wounds and other injuries on the body are suggestive of a previous struggle and hence of homicide, yet wounds may be produced by jumping into the water from a height and the body striking against rocks, poles or even against the surface of the water itself. Trivial injuries on the body may be due to the action of fish, frogs, &c. However, the presence of several injuries on the body, together with the signs of death by drowning, are indicative of homicidal drowning.

**The time required for a body to float.**—The decision of this question is by no means easy, as it depends on a variety of conditions.

It will be remembered that in a previous page a case was referred to where a body floated with a large weight attached to it in 30 hours. Fat persons, females and children float sooner.

Floating is delayed by the body being clothed. It takes place earlier in the hot than in the cold seasons, and in salt water than in fresh water.

## CHAPTER IV.

### SUFFOCATION.

A person is said to die of suffocation when the cause of death is obstruction to breathing by some means which does not act by compressing the trachea or larynx as in hanging, strangling or throttling. According to this definition, therefore, death from drowning is one mode of death from suffocation.

Death by suffocation may be caused by the inhalation of impure gases (carbonic acid, carburetted hydrogen, sulphuretted hydrogen, &c.), or by the inhalation of small particles floating in the air, or by pressure of the chest when a person is caught in the crowd, or by covering a person's mouth and nostrils (smothering), or by a person being buried alive, or by foreign matters getting into the air passages, as when vomitted matters or the

contents of an abscess get into the trachea and larynx, or by injuries which fracture the larynx, &c., and thus cause impediment to respiration, or by certain diseases such as pneumonia, or by the action of certain poisons such as nux-vomica which act by contracting the muscles of the chest, or by stuffing the mouth with cloth or other material.

**Cause of Death.**—As respiration is seriously interfered with, the blood soon becomes impure, the brain is therefore supplied with unœrated blood, the person becomes unconscious. Death is therefore due to asphyxia.

**Signs of Death by Suffocation.**—The blood is very fluid and dark-purple in color, except when suffocation is caused by carbon monoxide, when the blood is red in color. It takes a long time for the body to cool.

The right side of the heart is engorged with blood, the left side being nearly empty.

The lungs as well as the pulmonary artery are also generally much congested. The inner lining of the trachea is greatly congested and very red in color. A small quantity of frothy mucus may be present in the trachea.

The kidneys generally contain a good deal of blood. The abdominal veins and the intestines are all more or less congested.

There may be more or less apoplexy of the brain.

In the case of persons buried alive, the stomach contains ashes, mud, sand or other material in which they had been buried.

**Homicidal, Suicidal or Accidental?**—Professor Taylor says, 'that in medical jurisprudence there is not perhaps an instance in which we have fewer medical data upon which to base an opinion than in a case of alleged death from suffocation.'

Therefore unless the medical man's suspicion is roused by circumstantial evidence, he may attribute death to natural causes, except in those cases where there are marks of injury to the larynx, &c., or where there are foreign bodies occluding the respiratory passages.

Accidental suffocation is not rare. The deceased may have fallen in a fit with his face being covered with ashes, mud, &c., and suffocation might have resulted. This may also happen in the case of children and drunkards.

The larynx and trachea may be so injured as to cause suffocation by impediment to breathing, and the injuries may be attributed to accident.

In deciding this question, it is well to bear in mind the results of the experiments of Dr. Keiller as regards accidental injuries to the larynx.

His conclusions are :—

'That *ordinary falls* on the human larynx are apparently not capable of producing fractures of its cartilage, and even *falls from a height with superadded force* appear to be unlikely to do so.

'2. That *severe pressure applied from before backwards*, so as strongly to compress the larynx against the vertebral column, or *violent blows inflicted over the larynx by means of a heavy body* are sufficient to cause fractures of the larynx. Fractures so produced, however, will be most discernible on the internal (or posterior) surface, and generally *in or near the mesial line*.

'3. *Violent compression applied to the sides of the larynx* (as in ordinary manual throttling or strangulation by grasping) is of all applied forces the most likely to produce fractures of the *alæ* of the thyroid cartilage, or even of the cricoid cartilage, and fractures so produced are most perceptible, as well as most extensive, on the external (or anterior) surface of the larynx.

'By this *lateral* mode of applying force, the *hyoid bone* is also most readily broken.

'4. That the condition of the larynx in regard to the absence or presence of ossific deposit materially influences its liability to fracture from external violence. If altogether cartilaginous, partial splits or splittings may be produced. If partially ossified, fractures may be produced by a comparatively moderate degree of applied violence, and if extensively or entirely ossified, extreme violence will be generally required to produce laryngeal fracture.'

Victims of homicidal suffocation are generally infants, the aged and the infirm, or persons weakened by disease.

Suicidal suffocation, though extremely rare, is still a matter which should not be passed over, as cases are on record where persons have so stuffed their mouth with cloth, mud, &c., as to produce death by suffocation.

**Smothering.**—As has already been observed, this is only a mode of suffocation. It consists in the simple closing of the mouth and nostrils by any method calculated to stop respiration. Newly born infants are generally the victims of this form of death. Smothering may, however, take place accidentally, as when an intoxicated person falls with his face on a heap of ashes.

When it is the result of homicide, and the person was in a fit condition to offer resistance, there may be marks of violence, such as scratches, bruises, &c., found on the body. In all cases of alleged suffocation, the possibility of death by any other means (poisoning, &c.) should be constantly borne in mind.

## CHAPTER V.

### STARVATION, LIGHTNING, HEAT, COLD.

**Death by Starvation.**—Infants may be starved to death. In order to substantiate a charge in these cases, it has to be proved not only that the necessary quantity and quality of food has not been given, but there has been malice. Very little is known as to the exact time necessary to cause death by starvation; but it seems life can be prolonged for several days if only a little water is allowed. "In cases of infanticide by starvation, the mother and not the father is responsible for the proper feeding of the child; but in the case of an apprentice, the master and not his wife is bound to supply proper food to such apprentice."

**Death by Lightning.**—This question has to be considered merely because wounds caused by personal violence may be attributed to the effects of lightning or *vice versa*.

The occurrence of a storm when the death is said to have taken place and other circumstantial evidence will suggest the real cause of death. Death by lightning does not always take place immediately. Tearing wounds are generally inflicted, but piercing ones are only less common. The clothes may be torn off without any personal injury. Steel articles worn on the person become magnetic.

**Death from Heat.**—Death is said to take place from sunstroke, when a person dies from excess of heat in his system owing to exposure to the sun. Death from this cause usually occurs immediately; and when it does not, the following well marked *symptoms* are present:—Giddiness, headache, disturbance in vision, flushing of the face, difficulty of respiration, &c. The skin is hot and dry, and the temperature of the body is much higher than normal.

The only *post-mortem* appearances which have been observed in cases of sunstroke are fluidity of the blood, some congestion of the brain generally, and extreme congestion of the lungs, with distension of the right side of the heart.

In these cases, the previous history, &c., throw sufficient light on the nature of the death.

**Death from Cold.**—In this country, cases rarely occur in which death takes place from cold. But death is likely to occur from this cause during cold weather in ill-fed and badly clothed persons living on the hills. The subject is, therefore, one which should not be entirely passed over.

**Symptoms.**—When a person is exposed to a low temperature, the blood takes less oxygen, and consequently becoming impure affects the brain and the nervous system. The person reels about, as if he is intoxicated, complains of giddiness and dimness of sight, and soon becomes lethargic. Tetanic convulsions quickly follow, and he succumbs.

**Post-mortem Appearances.**—The following appearances when present afford according to Ogston a high probability as to the cause of death being cold :—

1. An arterial hue of the blood generally, except when viewed in mass within the heart.

2. An unusual accumulation of blood on both sides of the heart, and in the larger blood vessels of the chest.

3. Pallor of the general surface of the body, and a bloodless condition of the internal organs, which are largely supplied with blood.

4. Irregular and diffused dusky-red patches on limited portions of the exterior of the bodies, met with in non-dependant parts, these patches contrasting forcibly with the pallor of the skin and general surface.

## PART III.

### WOUNDS, BURNS AND SCALDS.

#### CHAPTER I.

#### GENERAL REMARKS ON WOUNDS.

The law does not define what a 'wound' is. All wounds have to be classed under simple hurt or grievous hurt.

Dr. Taylor's definition seems to be the best for medical as well as for legal purposes. He defines it as 'a breach of continuity in the structures of the body, whether external or internal, suddenly occasioned by mechanical violence.'

This would include all injuries to the skin, the mucous membrane, the internal organs and structures as well as simple and compound dislocations and fractures. Burns, scalds and corrosions are not included under the category of wounds.

Wounds are dangerous from shock, from hæmorrhage, from the supervention of tetanus, erysipelas, septicæmia, &c., from negligence and want of care on the part of the patient, or from want of care or skill of the surgeon. There are several important and interesting questions concerning wounds, which should here be separately discussed.

**Is the wound dangerous to life?**—When this question arises, it is not enough if the surgeon simply says that in his opinion the wound is dangerous to life. He must clearly state all the reasons which made him form that opinion, and every single detail will be made the subject of careful inquiry by the examining counsel. Only such wounds should be considered 'dangerous to life' where the danger is imminent, as when a large artery or some internal organ has ruptured, or when the bones of the skull are broken and exposed.

When the danger is remote from the probable supervention of complications, the medical opinion must be qualified. For, though the most trivial injuries have caused death, the most frightful ones have ended in recovery. In all such cases, the



medical jurist will act judiciously to pay attention to the age, vitality, latent disease if any, of the patient, the previous treatment, the extent of injury, noting the damage done to the parts and to the large blood-vessels and nerves, as well as to the nature of the weapon used to inflict the wound.

Is the wound such as to cause 'grievous bodily harm'?—that is to say, is the wound of such a nature as to seriously inconvenience the person or impair his health, though it may not prove fatally? When this question is asked, the best course for the medical witness to adopt is to give a plain description of the wound, to enumerate all the consequences with which it is generally attended, and to leave the rest to the court.

**Medico-legal duties of a surgeon when called to examine a wounded person.**—He should immediately go and see the patient and examine his injury if it has not been already dressed by a qualified medical practitioner. (If it had been dressed, he should not remove the dressings in the absence of the surgeon who dressed it.) In examining the wounded person, he should carefully note the exact condition of the patient, and minutely describe the wound or wounds as regards position, extent, &c. He should examine all instruments said to have caused the wounds, and hand them over to the police. If he thinks that the wound is 'dangerous to life,' he should send for the magistrate to take a 'dying declaration.'

**Examination of Wounds on the Dead.**—The length, breadth and depth of a wound should be accurately measured to determine the nature of the instrument with which the wound may be said to have been inflicted. The situation, extent and direction of the wound should be minutely described. Any marks of ecchymosis should be vigilantly looked for; and if any be present, it should be noted whether the blood effused was coagulated or liquid. The wound should be examined for the presence of foreign bodies, pus, adhesive inflammation, gangrene, &c.; for the presence of pus, &c., will point to the person having survived the wound for some time.

The external appearance of the wound should be interfered with as little as possible, in order to be able to compare it with the weapon suspected or alleged to have produced it. Any relation of the wounds to cuts or rents in the cloths should be noted. In all cases, where the cause of death is not clear, the stomach should be examined for poison, and all the internal organs for injury, as otherwise the counsel for the defence will attribute the death to natural causes. When the condition of all the

important internal organs have been described, the medical man should never omit to say, "all other organs healthy" if they have been found to be so. If this precaution is not taken, the counsel for the defence is sure to say that death was due to a diseased condition of that particular organ, the state of which was not described. All descriptions must be clothed in clear, plain, untechnical language.

**Was the wound inflicted during Life or after Death ?**—If marks of adhesive inflammation, or of pus (which, however, it may be theoretically argued, may be put on a wound by another), or of gangrene are found about a wound ; or if the margins of the wound are swollen, or if granulation or cicatrization has taken place, then there is no doubt that the person has lived for some time after the wound was inflicted. But in cases where these marks are not present, and the medical man has to examine the body a few hours after death, attention to the following points will aid in forming an opinion.

*In wounds made during life or immediately after death*, the edges of the wounds are everted and injected, the muscles and skin are retracted, profuse bleeding (generally arterial) has taken place, with general diffusion of blood in the surrounding tissues, and there are large blood clots.

*In wounds made a few hours after death*, on the other hand, there is neither retraction of the skin and muscles, nor eversion of the edges (except in fat persons, or as a result of putrefaction) ; there is no profuse bleeding, and should there be any, it is venous in character, and there are no large clots.

**Medical Evidence on the use of a Weapon.**—It is of much importance to decide whether a particular wound was inflicted by a weapon ; because it indicates malice aforethought on the part of the accused, and would therefore enhance his punishment. Even if a medical witness is convinced that a wound in question was produced by a certain weapon after a careful examination of the wound and comparison of the weapon with the wound which it is said to have inflicted, he will act wisely to say before the court ' that the wound should have been produced by that weapon or one similar to it.'

**Is the Wound Accidental, Homicidal or Suicidal ?**—A person may attempt suicide and inflict certain ineffective wounds on himself. He may then get ashamed of his own act, and impute it to an assailant. A person may have accidentally wounded himself and take the opportunity to bring a charge against an enemy of

his. A person may wilfully inflict certain wounds on himself to get an enemy into trouble. A murderer may attribute wounds which he had inflicted on his victim to accidental origin. In such cases, it is necessary to decide whether the wound is homicidal, self-inflicted or accidental.

The medical man should pay particular attention to the situation, extent, direction and nature of the wounds, as well as to circumstantial evidence, in order that he may be able to form a correct opinion on this important question.

Accidental wounds are generally found on exposed parts.

Self-inflicted wounds are usually found on the front and sides of the body; they may be found on either arm according as the person is right or left handed; they are generally parallel to each other, except in old persons, in whom the skin is shrivelled; they are mostly incised, punctured or gunshot, contused and lacerated wounds being very rare. Those made with the intention of charging a person with crime are generally superficial and small. Those made with a suicidal intent are more severe and on vital parts, such as the heart, neck, &c. Very large and deep wounds, however, are seldom the work of a suicide.

Suicidal gunshot wounds are generally found on the temples, the heart or the mouth. Wounds horizontally made on the back are strongly against self-infliction. Regular, incised wounds are strongly suggestive of suicide. Suicidal incised wounds are generally from left to right, but this will not be the case if the person is left-handed. Suicidal punctured wounds are from right to left, and are from above downwards. Oblique wounds, the directions of which are from above downwards, may be self-inflicted, or the result of an assault. But those directed from below upwards are strongly presumptive of homicide.

In all these cases, it is advisable to place the instrument alleged to have caused the wound in either hand of the wounded person and move the arm towards the wounded part; to see if the direction of the wound would correspond to it in any position. It should be remembered that there is no wound which appears to be self-inflicted, that cannot be the work of an assailant.

Several weapons may have been used to produce the wounds; for instance a person attempting to commit suicide with a razor may fail in his object, and then resort to the use of a revolver.

When a pretended assault is suspected, it is essential to examine the clothes for rents corresponding to the cuts found on the body,

and it will generally be found that the rents are larger or smaller than the cuts.

When two or more mortal wounds are found on a body, it is said that this is strongly presumptive of homicide. This does not always hold good, for a person is not generally so disabled after inflicting one severe wound on himself as to be incapable of inflicting another of a serious nature. But when there are several wounds on the neck, each implicating the chief blood vessels, there is strong reason to infer that it must be the work of a murderer.

When there are several wounds on a body, the medical jurist may be required to determine which of them was inflicted first. This is by no means easy to decide. It is presumable, however, if one of the wounds is mortal in its nature and others trivial in character, that the trivial ones were first inflicted. But when a number of persons had attacked a person, the wounds may have been produced simultaneously.

**Circumstantial Evidence.**—Though evidence from circumstances is not in itself enough to enable a medical man to form an opinion about the question under consideration, still it will be of material assistance to him in forming his decision when coupled with the medical evidence in his possession.

Many are the tricks which are practised to give an air of suicide to a case of murder, or to attribute death produced by violence to natural causes. The medical man should, therefore, be very cautious in drawing inferences from facts which fall under his observation, and he must make due allowance for all the probabilities of the case. He must always remember that it is his duty to place all the circumstances of the case clearly before the court, and leave it to draw its own conclusion.

Many are the details which would guide him in forming his opinion, and the urgent necessity for his careful investigation into every little point cannot be too frequently impressed on his mind.

The position of a dead wounded body may be such as to be compatible only with interference by others, either when the person was dying or immediately afterwards. For instance, a person may have been murdered in one place and drawn from there to a more secluded spot for purposes of concealment. In such a case, the track left by the body being drawn all along, with marks of blood in its course, clearly prove that the death must be homicidal.

The position of the weapon again gives valuable evidence in some cases. If the weapon be firmly grasped in the hand, it is confirmatory of suicide, as it is due to 'cadaveric spasm,' which has been treated of elsewhere. If the weapon had been placed in the hand of the deceased by a homicide, the weapon will be lying loosely in the hand and can be easily removed.

In the case of a suicide, the weapon is generally found near the body or grasped in the hand. It may, however, be found at a slight distance from the body, from its having been thrown there by the deceased; it may also be found under him, as when he had rolled over it during his groaning moments. If on the other hand the weapon is found in a concealed situation, as under his bed, or far away from him, it points to homicide. It is generally supposed that, if there be much blood about the body, the weapon which inflicted the wound must be covered with blood. This view is not correct. A blunt instrument, which smashes a person's head and gives rise to profuse bleeding, may not have a single drop of blood on it. Even in the case of a stab, the weapon may have little or no blood on it, as the blood is generally wiped off by the contracting sides and edges of the wound, especially when the instrument is sharply thrust in and quickly withdrawn.

The presence of coagulated blood on the weapon indicates that the wound was inflicted during life or soon after death. If there was only a trace of blood on the weapon, it would present a yellowish-red appearance when dried, and look like rust.

This, however, can be easily detected by chemical and other means (*vide* Blood Stains). If the weapon has been washed, the handle, the letters on the blade, and the space between the blade and handle should be examined to detect any traces of blood.

Hair and other substances found on the weapon must be compared with those found on the body and dress of the deceased. Foreign bodies found in wounds generally suggest the mode in which those wounds were produced.

Marks of blood on certain positions of the body, on the cloths, or furniture often afford important evidence as to what has taken place. If a body is found with the throat cut and blood flowing down the sides of the neck and not on the front of his body, it is suggestive of the person having been murdered in that position. Marks of bloody fingers on the throat, with marks of nails round the mouth, and wounds elsewhere on the body, are strongly suggestive of a struggle having taken place between the deceased and the assailant. Marks of blood on distant furniture

show that the deceased or the criminal has walked about the place. If there is a large pool of blood in one place and traces of blood elsewhere, it suggests one of two things,—either that the crime was perpetrated in the former place and that the criminal was walking about the place with bloody hands, or that the deceased died in that spot after having walked some time with blood flowing from his wound.

Marks of bloody fingers should be examined as to their position to see if they could have been the marks of the fingers of the deceased himself. It should be noted whether the palm or the back of the hand of the deceased is stained with blood; whether the cloths are stained with patches or sprinkles of blood; whether the whole texture of the cloth or only one side of it is stained with blood. The last would suggest that imposture has been practised.

About the cloths of the accused, it should be first clearly ascertained if the produced cloths were those actually worn by him. It is not necessary that the cloth of the accused should be disfigured with blood, as it entirely depends on where he stood in relation to his victim, while inflicting the wound. Besides, it should not be forgotten that small spots of blood may possibly be due to flea-bites or scratches, &c., that the accused may be quite unable to explain these small dots of blood on which the charge against him is framed, and that he may be perfectly innocent.

## CHAPTER II.

### CLASSIFICATION AND DESCRIPTION OF WOUNDS.

For purposes of description, wounds may be divided into two great classes,—the open and the subcutaneous; the latter including fractures, dislocations, &c., and the former being divided into the incised, contused, lacerated, punctured and gunshot.

**Incised Wounds** are generally produced by sharp instruments, though they may be caused by blunt ones, as rice pounders, stout bamboos, &c., on tense and resisting parts of the body as the scalp and shin.

Incised wounds have clean and regular edges; they taper towards both ends, with the widest gap in the middle. Wounds made in the course of the fibres of a muscle gape much less

than those made obliquely or across them. In incised wounds, the surrounding tissues are infiltrated with blood, and clots of blood are found between the edges and at the bottom of the wound. Bleeding is the chief source of danger in incised wounds.

**Contused and Lacerated Wounds.**—Contused wounds are produced by blunt instruments that bruise; wounds inflicted by blunt weapons which tear being called lacerated. The edges are never regular and smooth in these cases, and are ecchymosed. Bites and scratches fall under this group. Bleeding from them is rare; but the chief danger in connection with them is due to the after-complications. Except when caused by accident, they are indicative of a struggle as in cases of rape, &c.

**Punctured Wounds** are those made with piercing instruments, such as daggers, arrows, &c. They are popularly known as stabs. The wounds are generally smaller than the weapons used, except when the weapon has been moved from side to side. They may look like incised wounds. The depth, however, settles the doubt. Unless made with a rough instrument, the entrance opening is inverted, *i.e.* pushed in, while the exit one is everted, pushed out. Of course, there need not always be an exit opening. There may be only one entrance opening and two or more stabs inside, this fact pointing to the instrument having been thrust in and then partly withdrawn and then thrust again. External bleeding from them is small, except when large blood vessels are involved. But they are dangerous from their internal and unsuspected bleeding and from their complications.

**Gunshot Wounds** are defined by Professor Longmore as ‘injuries which result from the action of missiles set in motion by a force which is derived from the ignition of explosive compounds.’ The external appearance of gunshot wounds depends on the form of the projectile and the distance at which the weapon was discharged. Conical balls produce smaller openings than round ones. A large irregular opening may be made by small shot, if fired from a short distance. The scattering of the shot depends on the distance, the charge of powder and the calibre of the gun. Gunshot wounds are either contused or lacerated. As in them, their edges are ecchymosed. Conical balls do greater damage to bones than round ones, which are easily deflected. Gunshot wounds have a feature which is the exact reverse of punctured ones, *viz.*, the former widen as they deepen, while the greatest width in the latter is at the point of entrance of the weapon. The ball may or may not perforate. If it does not perforate, it may lodge in the body together with bits of cloth or

wadding which it may have carried with it. When the ball has perforated, it is of importance to decide which is the entrance and which the exit wound. The entrance wound is said to be inverted and smaller than the exit one, which is said to be larger, everted and with ragged margins. No marks of blood are found at the entrance wound while the edges of the exit wound are stained with blood clots. After some time, there is discoloration about the entrance wound, while it is not apparent in the exit wound. On these points, however, authorities are not agreed.

The contents of all gunshot wounds should be preserved, as they may be required for evidence.

Two important points may have to be settled in cases of gunshot wounds, *viz.*, the distance from which the gun was fired and the direction in which it was fired.

In deciding the distance, the scattering of the shot will guide if the injury be caused by small shot. If there be any scorching or marks of the partly burnt powder about the wound, the distance must have been within four feet. The absence of these signs is not a sure indication that the shot has come from a distance.

The course of the ball through the structures of the body, which, by the bye, it is impossible to trace in the cavities, and its effects on the surrounding objects, when put along with circumstantial evidence, will help in finding its direction. Gunshot wounds made on persons in the standing position are transverse in their direction.

Gunshot wounds may be accidental, homicidal or suicidal; but this must be judged by considering the collateral circumstances, remembering that suicidal gunshot wounds are generally found in the region of the heart, the temples or the mouth.

### CHAPTER III.

## CONTUSIONS AND BRUISES.

“A ‘contusion’ is an injury caused either by a fall, a blow from a blunt instrument, or severe pressure, in which there is no breach of continuity of the skin.” The degree of injury depends on the amount of force applied and the resisting power of the tissues injured. When the force has been sufficient to cause rupture of the small blood vessels in the skin and subcutaneous tissues, an ‘ecchymosis’ or ‘bruise’ is said to exist.”



An **ecchymosis** is therefore an effusion of blood. It appears usually within a few minutes or hours after the injury as a deep-blue, or black patch, which in about 15 hours becomes larger and lighter at its margins. It then undergoes a series of changes in its color, becoming violet on the third day, yellowish-brown on the fifth, slightly green on the sixth, and yellowish on the eighth. It then gradually fades into a lemon tint, and finally it disappears altogether. These changes in color are of medico-legal interest, as with their help the time when the injury was inflicted can be approximately determined. Although the presence of ecchymosis is presumptive of the infliction of an injury, its absence is no proof that a contusion has not been experienced, since a fatal rupture of deep parts or of some organ may take place without any external signs of injury being present. Deep seated ecchymosis may not show itself externally altogether or till after some days. In some cases again, the ecchymosis may not appear for some hours after death. In such cases, it may be asked, *if the ecchymosis could not have been produced by blows on the dead body?* A very great deal of force has to be used on the dead body to produce an amount of ecchymosis which is produced by a slight blow inflicted during life or immediately after death. Such an amount of violence will very rarely be done to a dead body, and even if it is, there must be signs to indicate it. Therefore when a well-marked bruise is found, it is right to infer that the injury has been inflicted during life or immediately after death. In this connection, attention must be directed to the fact that ecchymosis from violence is liable to be mistaken for hypostasis. The differences between the two conditions have been pointed out on a previous page.

The extent and the shape of a bruise should always be noted.

## CHAPTER IV.

### CAUSES OF DEATH AFTER WOUNDS.

In cases of death after wounds, the real cause of death must be ascertained; for a slight injury inflicted on a man in very delicate health may be enough to kill him. A man suffering from some long standing disease may die soon after receiving a wound. In such a case, the counsel for the accused would very naturally attribute the death to the disease. The medical man, therefore, must evenly weigh all the circumstances of the case, and then form his decided opinion as to the true cause of death. If, however, he

has any doubts on the matter, it is better for him to explain his difficulties clearly to the court.

Death following wounds may be due to several causes.

The immediate causes of death are hæmorrhage and shock.

**Hæmorrhage**, or loss of blood may cause death in two ways,—either by mechanical action or by producing syncope.

As examples of hæmorrhage producing death by mechanical action, may be mentioned those produced by occlusion of the air passages by blood flowing into the trachea, or by effusion of blood into the pericardium or the pleura, interfering with the action of the heart or lungs.

Loss of blood sustained suddenly proves more fatal than the same quantity lost more slowly. The quantity of blood that should be lost to cause death cannot be specified. But children, women and those in delicate health die from the loss of a comparatively small quantity of blood. It is said that if from 5 to 8 lb. of blood be lost in an adult, it is sufficient to cause death.

Profuse bleeding may take place internally by the rupture of some organ or blood vessel, and cause death in a few minutes without any hæmorrhage externally. This condition will be evident on *post-mortem* examination.

*Signs of death by external hæmorrhage.*—If the amount of blood lost externally is not known, and if it should be decided that death was due to external hæmorrhage, the following conditions must be present:—The wound must be in a very vascular part, or a large artery or vein must be found cut, with the surrounding blood vessels empty; the blood remaining in the body should be fluid, the surface of the body very pale; and there should be no other cause of death.

**Shock.**—Death from shock is said to be due to temporary exhaustion and excessive expenditure of nerve force.

Whatever the explanation may be, cases are not at all uncommon in which persons die of shock without any external signs of injury, or other cause to account for the death. As instances may be cited, deaths following blows on the pit of the stomach, blows on the head, railway collisions and deaths due to the effects of lightning. Death from shock may also result when a large number of injuries is inflicted, each being comparatively trivial. Instances are not wanting of school boys having died shortly after a smart thrashing. The medical jurist should not forget this as

a cause of death; for if he does, a person who murdered another by inflicting a blow, without producing any external or internal injury, may easily escape punishment.

The secondary causes of death after wounds may be either avoidable or unavoidable.

There are certain deaths the causes of which are avoidable but for unskilful treatment, but for an unhealthy state of the wounded person, or but for the negligence and want of care on the part of the patient.

Certain causes there are, however, which from the nature of the injuries inflicted are unavoidable even under the most favorable circumstances and in the most skilled medical hands.

These will be considered in the next chapter.

## CHAPTER V.

### RESPONSIBILITY FOR THE DEATH.

On this point the law here is different from what it is in England. In India, the intention of the person who inflicted the wound is the chief consideration. In England, if a person dies from any of the causes of death either immediate or remote, the person who inflicted the injury is responsible for the death, presuming that an ordinary skilful medical treatment is given him.

If a wound which is not in itself mortal proves fatal by unskilful treatment, or by the interference of an unskilled person, the question may be raised as to how far the accused is responsible for the death. In connection with this question, the remarks of Lord Hale are as follow:—"It is sufficient to constitute murder, that the party dies of the wound given by the prisoner, although the wound was not originally mortal, but became so in consequence of negligence or unskilful treatment; but it is otherwise where death arises not from the wound, but from unskilful applications or operations used for the purpose of curing it." Such a subtle difference, however, could scarcely be maintained in practice.

Great responsibility rests with the medical man who undertakes the treatment of criminal wounds. If for instance in the case of a severe crush of the foot, the surgeon thought it best to amputate the leg and death ensued, the counsel for the defence would say that the death was due to the operation. If, however, the

surgeon did not amputate, and death resulted, the counsel is almost sure to say that, had an operation been performed, the person's life could have been saved. In such cases, the medical man must be able to prove that the course he adopted under the circumstances was according to the ordinary rules of practice. In criminal wounds, therefore, no novel operations or methods of treatment should be tried. The commonest practice should be adopted.

In undertaking operations generally for the treatment of criminal wounds, the medical jurist will do well to remember Lord Hale's remark that the responsibility of the criminal ceases when death is due to an unskilful or unnecessary operation and not to the wound. It is very difficult, however, to attribute a certain death to the wound or to the operation, as death might follow the most skilled operation and have nothing to do with the wound itself.

Cases are recorded in which the prisoners were acquitted on the assumption that the treatment was either unskilful or unnecessary. Instances again are numerous of persons having been convicted under the very same circumstances, on the ground that had it not been for the injury, no operation would have been performed.

The prevailing opinions on this subject of the highest judges seem to be these:—

That only an ordinary amount of skill is to be expected of the medical man. That the assailant is responsible for deaths following operations performed *bonâ fide* and with ordinary skill and attention.

That deaths which take place after an operation which was either unnecessary or unskilfully performed, may mitigate the punishment of the offender.

That deaths resulting from operations which have been grossly mismanaged, or performed with great negligence, not only removes the responsibility from the aggressor, but also inculpates the medical man as being guilty of misconduct.

That in deaths following operations based on a mistaken diagnosis, the prisoner is still responsible, if the medical man is ordinarily skilful.

That in deaths following the administration of anæsthetics, the aggressor is responsible, if the anæsthetic was necessary

and skilfully given, and if there be no heart disease to account for the death.

That medical men are not to be charged for *malap Praxis* for slight deviations from the ordinary line of treatment, but that it is not to their interest to try novel modes of treatment in criminal wounds.

And that in no case should an operation be performed without the consent of the injured person, or of his friends when his consent is not available, as when he is unconscious.

**Want of care and prudence on the part of the Patient.**—If a person who is injured refuses to seek medical advice, or refuses to submit to an operation which is considered necessary to save his life by the surgeon, and death ensues, this injudicious conduct of the injured does not exculpate the aggressor; but if the facts of the case are clearly laid before the court by the medical witness, some mitigation of the punishment may be made.

**Unhealthy state of the Body.**—If the aggressor had inflicted only a slight blow on a person suffering from a grave disease and death occurred, the aggressor will be held responsible for the death, if he was aware of the diseased condition of his opponent, although the disease in itself would have ended fatally.

The definition of the Commissioners appointed to define the criminal law on the subject is in conformity to the decision of the judges. They say that "it is homicide, although the effect of the injury be *merely to accelerate the death* of one laboring under some previous injury or infirmity, or although, if timely remedies or skilful treatment had been applied, death might have been prevented."

But the case is different when the aggressor is not aware of any abnormal condition existing in his opponent. In such a case, the responsibility of the aggressor is not so great as under other circumstances, and a mild punishment may be awarded to him though he is guilty of manslaughter.

In such rare cases, as where a slight injury is inflicted on a man suffering from some long-standing disease and the man dies, if it could be proved by the medical witness that the man would have died at about the same time even if the injury was not inflicted, and that the injury did not accelerate the death, then it would appear that the aggressor is not guilty of manslaughter.

**When two wounds exist.**—When two wounds have been inflicted on a person by different individuals at a more or less interval of time, and when death follows the second, the question will be raised as to which of the wounds caused the death. If the death followed the infliction of the second injury, without his previous condition having been such that death could be attributed to the first, the second aggressor will be guilty of manslaughter. If the second injury was very slight, and if the death is attributed by the medical witness only to the first wound, then the first aggressor will be held liable. If, however, when the person is in a precarious state after the infliction of a wound, a second one is inflicted and he dies after some time, both the wounds being in much the same condition, then both may be held liable.

In all these cases, the medical man's responsibilities are very great; for he is practically called upon to decide who is guilty and who is not.

It will thus be clearly seen from the foregoing, that the English law bases the punishment on the consequences that actually take place, irrespective of any intention or forethought in the aggressor. In Indian law, the intent to do harm is the main principle, due attention being paid to the ensuing consequences.

Among the unavoidable causes of death may be enumerated tetanus following nerve and tendon lacerations, peritonitis following severe injuries to the abdomen, and erysipelas attacking severe lacerated wounds of the scalp. In these cases, when the time of death is more or less remote from the time when the wound was inflicted, the question arises as to the responsibility for the death of the wounded person. The difference between English and Indian law on this subject has been alluded to above.

**Remote causes of Death.**—Among the remote causes of death after wounds, have to be considered tetanus, erysipelas, delirium tremens, pyæmia and hospital gangrene. "

**Tetanus.**—This disease may be either idiopathic (of spontaneous occurrence), or traumatic (following wounds). It may come on as a result of exposure to cold, or of the irritation of intestinal worms, or of dentition in children. It may follow the most trivial wounds. It generally occurs after crushing injuries of tendons or nerves. It usually proves fatal. The idiopathic form cannot be distinguished from the traumatic from the symptoms. The medical witness should, therefore, be very

careful before venturing on an opinion that tetanus is the result of a wound.

**Erysipelas.**—This disease may show itself after injuries to the scalp, neck or face. It occasionally comes on without any assignable cause. It may, like tetanus, prove fatal after slight injuries. As it generally attacks wounds and their neighbourhood, there is no difficulty in attributing it to this origin. But when it comes on after the lapse of some time, its origin might be doubted, and in such cases the accused gets the benefit of a doubt.

**Delirium Tremens.**—It occurs in persons of intemperate habits and unhealthy constitutions, and may prove fatal whether the injury is slight or severe.

**Pyæmia.**—This, like tetanus or erysipelas, may come on quite independent of any wound or injury. The modern system of treating wounds has almost eradicated this disease. Formerly it was a great terror in hospitals.

**Hospital Gangrene.**—This is another disease which was much dreaded in former days. It attacked wounds in ill-ventilated and overcrowded hospitals, and was very fatal.

## CHAPTER VI.

### BLOOD-STAINS.

Blood-stains submitted for examination may be recent or very old. They may be on cloths, weapons, articles of furniture, &c.

When on cloths, a piece of the stained portion should be cut off and soaked in some distilled water. When on weapons the stain should be scraped off and placed in some distilled water, and the solution must be filtered to separate the rust. When on wooden furniture, a chip may be sliced off and treated as above.

When imposture has been practised, the stains may be due to vegetable coloring matters, or to the blood of other animals.

### TESTS.

1. A solution of blood stain is of a deep-red or reddish-brown color. If the stain is due to rust, the water is not colored, as rust does not dissolve in water.

2. Heat a small portion of the solution in a test tube. If the stain is due to blood, a clot is formed which dissolves in hot caustic potash. This mixed solution is greenish by transmitted and red by reflected light.

3. To another portion of the original solution add a little nitric acid. If the solution contains blood, a greyish white precipitate is formed.

4. To a third portion of the solution, add a little tincture of guaiacum. A reddish precipitate is at once formed, if the solution contains any trace of blood. If an ethereal solution of peroxide of hydrogen be now added, a bright blue color is immediately developed. This blue color does not appear immediately if the stain be due to other coloring matters. This is a very delicate test. By this test, the presence of one drop of blood in one-eighth of a Madras measure of water can be detected.

5. A portion of the blood should be examined for hæmin crystals.

6. Examination by the spectroscope, the most delicate test of all.

Blood stains on weapons can be roughly tested by heating them. If due to blood, the stain will peel off. Blood stains on colored cloths which have been washed become blue at once if moistened with tincture of guaiacum and an ethereal solution of the peroxide of hydrogen.

There is no method of finding out whether a stain is due to menstrual blood or to that from a wound. It is also difficult to say whether a stain is that of human blood, or that of the blood of other animals. When the solution is subjected to a microscopic examination, the human blood corpuscles may be recognized as small, round, flattened cells about  $\frac{1}{3000}$ th to  $\frac{1}{4000}$ th of an inch in diameter. They are slightly depressed and concave in the centre, and consist of 'colorless envelopes containing a red fluid.'

## CHAPTER VII.

### INJURIES OF DIFFERENT PARTS OF THE BODY.

**Wounds of the Head**—Should always be watched with cautious anxiety, as the most trivial injuries have proved fatal, though the most horrible ones have been followed by recovery. Wounds



of the scalp are dangerous from their liability to be followed by suppuration or erysipelas. Either of them may occur after severe as well as after slight injuries. If the brain is also implicated, the dangers are heightened. The brain may have sustained severe shock (concussion of the brain) without the presence of any external injury. Blood may be effused on or into the substance of the brain as the result of an injury to the head (compression of the brain). Effusion of blood may take place spontaneously, as the result of excitement or as a consequence of diseased arteries. In all cases of death from injuries to the head, the state of the arteries of the brain should be carefully examined.

Recent effusions of blood are recognized by their bright red color and soft consistency; whereas the clot has acquired a brownish color and firmer consistence in old effusions. The symptoms of concussion of the brain should not be mistaken for those of profound intoxication. The odour of the breath and the previous history of the case will be of help in coming to a conclusion. Both the circumstances, however, may co-exist. The appearances of the brain after death are alike in both, in both the brain being congested. If alcohol is found in the stomach, that is presumptive of the man having been drunk. The medical opinion as to the cause of death should be very guarded in these cases.

**Wounds of the Face**, when of any size, generally end in deformity. This may lead to an action for civil damages. They may involve any of the organs of special sensation, and cause defect in that power. Penetrating wounds of the face may prove fatal by implicating the brain.

**Wounds of the Spinal Cord** may be caused by fracture or dislocation of the bones of the vertebral column. Concussion of the spinal cord may be produced by blows or shock, without any external marks of violence. Compression of the spinal cord may also take place from slight blows inflicted on the spine.

The higher the injury, the sooner does death take place, it being instantaneous when the injury is above the third cervical vertebra.

When the patient lives for any length of time, paralysis of the rectum, of the bladder and of the limbs come on sooner or later. Complete recovery from severe injuries of the spinal cord is very uncommon. In no case, therefore, should the prognosis of the case be hastily ventured.

**Wounds of the Throat** have been discussed already. When they prove mortal, death is due to loss of blood, or mechanical obstruction to respiration, or to the after complications.

**Wounds of the Chest**, when superficial, are not of much importance, unless they involve the *intercostal* arteries. But when these arteries are divided, death may take place from loss of blood, unless prompt surgical treatment is given.

When the internal organs are involved, death usually takes place with more or less rapidity. Death may take place by compression of the lungs when the pleura alone is injured, by air getting into that cavity, or by blood being effused into it. When the pericardium is injured, a similar result ensues from compression of the heart. When the heart is pierced, death usually takes place at once. But cases are recorded where the ventricles of the heart have been pierced and death did not take place till one or two months after. Wounds of the lungs may prove fatal either in a short time or long after from complications, though recovery has resulted in several cases even when bullets have been lodged in the lung tissue. Wounds of the main arteries and veins prove fatal within a few hours.

**Wounds of the Abdomen** may prove mortal from peritonitis, or from rupture of internal organs, or from division of blood vessels. In some of these cases, life may be saved by prompt surgical treatment.

When the wounds have completely healed, hernia may come on as a consequence of the weakness of the parts, the result of the wound.

**Wounds of the Genital Organs** may prove fatal either from profuse bleeding (if unchecked), or from shock, as when the testicles are squeezed.

**Dislocations** are not of much medico-legal importance. But in exceptional cases, it might be asked whether a dislocation on a dead body was produced before or after death.

In a recent dislocation which occurred during life, the surrounding tissues are torn asunder, and there is effusion of blood or coagulable lymph.

In old dislocations there are marks of cicatrices in the neighbouring structures. If produced some hours after death, no effusion of blood or lymph will be present.

**Fractures** are of considerable interest in medical jurisprudence. Fractures may be the result of blows, falls, disease or

other abnormal conditions. When they are the result of violence, signs of such violence having been used are usually discernible. When they are the result of blows without any external injury, they might be attributed by the accused to accident or disease. In diseases such as syphilis, the bones may be very fragile and may break after very trifling incidents. Instances have occurred in which the humerus was broken in the act of embracing a wife, of beating a son, of raising the hand to pelt a stone, and even while turning in bed. Bones of the very old and the very young break very easily.

These facts should be borne in mind, and the existence of such abnormal conditions ascertained, as they would tend to mitigate the punishment of the accused.

It may be asked if the fracture was produced during life or after death. The effusion of blood and lymph into the surrounding tissues and the laceration of the muscles will be present if it occurred some hours before death. If it occurred some days before death, the consistence of the 'callus' forming material will guide in approximately determining the length of time which has elapsed since the event took place. If it was produced some hours after death, no effusion of blood or lymph will be visible around the broken ends of the bone.

## CHAPTER VIII.

### BURNS AND SCALDS.

"A *burn* is caused by the application of concentrated dry heat to the body ; a *scald*, by the application of hot or boiling liquid."

Scalds by boiling water are not so serious as burns ; but when they are caused by liquids such as molten lead, they are as bad as the worst burns.

The effects produced by burns on the body depend on the intensity of heat as well as the duration of its application.

The effects of burns have been divided into six degrees :—

1st.—Simple redness and tenderness of the surface.

2nd.—The formation of blisters containing serum.

3rd.—Superficial layer of the true skin is destroyed.

4th.—The whole thickness of the skin is destroyed, together with portions of the subcutaneous tissue.

**5th.**—The skin, the subcutaneous tissue and the muscles are involved—a brittle, charred mass resulting.

**6th.**—Total carbonization of the parts.

The danger from burns is more in proportion to the area of the surface involved than even to the intensity of the burn. Persons seldom recover when more than a third of the surface is destroyed.

The old and the young succumb more easily to the effects of burns than the adult and the robust.

When a person is said to be burnt to death, the death is due to suffocation. When death takes place within two days after the occurrence, it is due to shock or collapse. When it occurs within the two weeks after, it is from visceral complications, such as ulceration of the duodenum, peritonitis, pneumonia, &c. When after that period, it is caused by exhaustion or pyæmia.

In some cases of murder, the body may be exposed to fire to hide the true cause of death. In such a case the question will be raised, was the burn produced before or after death? In burns inflicted during life, the true skin is distinctly red in color, and the deep red openings of the ducts of the sweat and sebaceous glands will be plainly visible. In burns inflicted after death, there is no redness, the color of the skin being dull white and the openings of the ducts grey in color.

When blisters are found, they are generally due to burns inflicted during life. They may, however, be found in bodies which are in a state of advanced putrefaction. Blisters due to burns on the living contain serum. Blisters due to putrefaction contain air. It should not be forgotten that blisters may be produced after death by exposing dropsical subjects to fire. In these cases, the previous history of the case and other circumstances will help to settle the matter without much difficulty. Besides blisters produced by a burn before death have their circumferences injected, which is not the case in burns inflicted after death.

**Homicidal, Accidental or Suicidal?**—A full knowledge of the circumstances alone will enable any one to arrive at a conclusion on this point. But it may be stated that to dispose of a body by burning is not a very easy task.

Scars due to burns generally produce great deformity.

## PART IV.

### PREGNANCY, DELIVERY, CRIMINAL ABORTION AND INFANTICIDE.

#### CHAPTER I.

#### PREGNANCY.

In trying to determine the absence or presence of pregnancy, the medical man "has before him a problem which is often beset with great difficulties, and on the proper solution of which the moral character of his patient, as well as his own professional reputation may depend." He should therefore be very cautious in his examination, and should not commit himself to any decided opinion, except on the most certain grounds. This caution is all the more important, for it is exactly in those cases in which his opinion is asked that the statements of the woman are of little or no value.

Pregnancy may be either feigned or concealed; or the woman may really believe that she is pregnant when she is very desirous to become so, or to satisfy her husband. It may be feigned to postpone a capital punishment, to escape punishment with hard labor, to produce a false heir to an estate, and in countries like England to induce the jury to award damages in case of breach of promise of marriage. It may be concealed for inducing abortion or committing infanticide, or avoiding disgrace when the husband is away.

#### SIGNS AND SYMPTOMS OF PREGNANCY.

1. **Sensation.**—Certain peculiar sensations connected with a fruitful union is a sign on which many married women profess themselves to be able to depend.

2. **Menses.**—The stoppage of the menstrual discharge is the first reliable indication of pregnancy. But it might be suppres-

sed by exposure to cold, general weakness, mental excitement especially in newly married women who are desirous of becoming pregnant, or in the unmarried and the widowed, when they have subjected themselves to the risk of impregnation. Besides the menses might appear during the first few months even when pregnancy has taken place. Conception may also take place when menstruation is normally absent, as during lactation. So, at the best, the cessation of menstruation is only a presumptive sign of pregnancy.

**3. Sympathetic disturbances.**—Certain sympathetic disturbances are established soon after conception. They are more marked in women of the upper classes. These are disinclination to eat breakfast, bringing up some glairy fluid, nausea or vomiting especially on rising from bed in the morning, and hence known as the ‘morning sickness;’ an abnormal appetite, the woman showing a craving for strange articles of diet, known as ‘longings;’ excessive secretion of saliva; a tendency to faint; &c. All these are only corroborative of more certain signs.

**4. Changes in the Breasts.**—The enlargement of the breasts, the engorged superficial veins, the dark areolæ, and above all, the secretion of milk are very valuable signs, especially in *primipara*. Milk may, however, in rare cases be present in the breasts of the non-pregnant.

**5. Increased Size of the Abdomen.**—The progressive increase in the size of the abdomen often leads to the suspicion of pregnancy. Before the third month the increase is chiefly lateral. Towards the end of the fourth month, it is about three fingers breadth above the symphysis pubis. About the sixth month, it is on a level with the navel. At the end of the seventh month, it is about two inches above the navel, which is now projecting and prominent. It then gradually increases till at full term it is as high as the ensiform cartilage. The enlargement of the abdomen may be due to other causes, which will claim attention when considering the diagnosis of pregnancy. •

**6. Quickening.**—About the 16th week after conception, the movements of the fœtus are slightly perceptible. They are more felt as pregnancy advances. They may cease for some time without any assignable cause, or may be entirely absent. If felt and seen by the medical man, they form a very valuable sign.

**7. Intermittent Uterine Contractions.**—If the palm of the hand is placed on the abdomen, the womb will be felt to contract

and dilate under it. This is a fairly reliable sign, though it is occasionally present in fibroid tumours of the womb.

**8. Vaginal Signs.**—The mucous membrane of the vagina becomes purple in tint, and the neck of the womb as soft as velvet. These are also valuable signs.

**9. Ballotement.**—This is the sensation produced by the foetus falling back on to the tip of the examining finger after a sudden push has been applied to it by the finger placed in front of the neck of the womb. This is a sign of much importance, as this sensation can only be produced by a body freely movable in the womb.

**10. Auscultatory Signs.**—Most important of these are the sounds of the foetal heart. They are first heard during the fourth or fifth month. Their frequency is about 120 to 160 beats per minute. They are best heard in the left side of the abdomen, half way between the navel and the anterior superior spine of the ileum. 'The sound has always been likened to the double tic-tac of a watch heard through a pillow, which it closely resembles.' If the foetal heart-sounds are heard, the existence of pregnancy is certain.

Thus though there are many signs and symptoms of pregnancy, many of them are untrustworthy in themselves. The certain signs are the pulsations of the foetal heart, the foetal movements, ballotement, the intermittent uterine contractions, and the presence of milk in the breast in cases of first pregnancy.

**About Pregnancy in general.**—Pregnancy is possible before the occurrence of menstruation. A woman may be impregnated when she is unconscious, *e.g.*, when she is asleep. The youngest age at which pregnancy is known to have occurred is 9 years. A woman does not generally become pregnant after the 52nd year; but she may become pregnant as long as menstruation continues. A woman may become pregnant within a month after her last delivery.

### Diagnosis of Pregnancy.

'The differential diagnosis of pregnancy has of late years assumed much importance on account of the advance of abdominal surgery. The cases are so numerous, in which even the most experienced practitioners have fallen into error, and in which the abdomen has been laid open in ignorance of the fact that pregnancy existed, that the subject becomes one of the greatest consequence . . . . . Carelessness, therefore, may lead to serious injury to the character, if not to the health, of the patient.'

The chief conditions most liable to be mistaken for pregnancy are :—(1) fatty enlargement of the abdomen, (2) distension of the womb by retained menses, (3) overgrowth of the womb due to congestion, (4) distension of the abdomen with serum (ascites), (5) tumours of the womb and ovaries and (6) spurious pregnancy.

A diagnosis of pregnancy from any of these abnormal conditions is only possible on a careful examination of the woman.

A medical man who examines a woman against her will is liable to heavy damages. The duty of the medical man ends with requesting the woman to allow of an examination. If she refuses, 'her refusal may go against her ; but of this she is the best judge.'

### Duration of Pregnancy.

The duration of pregnancy in the human female has always formed a fruitful theme for discussion amongst obstetricians. The reasons which render the point difficult of decision are obvious. As the large majority of cases occur in married women, in whom intercourse occurs frequently, there is no means of knowing the precise period at which conception took place. The only datum which exists for the calculation of the probable date of delivery is the cessation of menstruation. From calculations based partly on statistics regarding the period of time which elapses between the cessation of menstruation and the onset of labor, and partly on cases in which the effect of a single intercourse is known, the average duration is found to be about 278 days.

To predict the time at which the confinement may be expected, Dr. Matthews Duncan adopts the following plan :—

“ Find the day on which the female ceased to menstruate, or, the first day of being what she calls ‘well.’ Take that day nine months forward as 275—unless February is included, in which case it is taken as 273—days. To this add three days in the former case, or five if February is in the count, to make up 278. This 278th day should then be fixed on as the middle of the week, or to make the prediction the more accurate, of the fortnight in which the confinement is likely to occur, by which means allowance is made for the average duration of either excess or deficiency.’

In cases of pregnancy occurring during lactation, the period of quickening forms the datum. As has already been said, it first occurs during the 16th week. This, however, for reasons which have been given above, is not a reliable guide.



### Legitimacy.

In settling a question of legitimacy, the possible protraction of pregnancy beyond the average time, and of the limits within which such protraction can be admitted, is of very great importance. "The law on this point varies considerably in different countries. Thus in France it is laid down that legitimacy cannot be contested until 300 days have elapsed from the death of the husband, or the latest possible opportunity for sexual intercourse. This limit is also adopted in Austria, while in Prussia it is fixed at 302 days. In England and America no fixed date is admitted, but while 280 days is admitted as the '*legitimum tempus pariendo*,' each case in which legitimacy is questioned is to be decided on its own merits. . . . The evidence in favor of the possible prolongation of gestation is greatly strengthened by what is known to occur in the lower animals."

In connection with this subject of protracted gestation as bearing on legitimacy, a few words must be said about premature births and superfœtation.

**Premature Births.**—Dr. Taylor says, "we may regard all births before the 38th week as premature, and all those which occur after the 40th week as protracted cases." In cases of premature births, the medical man may be required to determine if the external characters of a child correspond with those which it ought to present, supposing it to be legitimately born.

There is little or no hope of a fœtus living if born before the 28th week. But cases are on record in which after delivery in the sixth month the children survived and were reared. Dr. Playfair says that he attended a lady who miscarried in the fifth month of pregnancy, the child being born alive, and living for three hours. The possibility of the birth of a living child under such circumstances should be borne in mind, as it may give rise to important legal questions concerning legitimacy.

**Superfœtation.**—This is said to take place when conception occurs in a woman who is already pregnant, resulting in the delivery of two children differing much in their degree of development at the same time or separately with a considerable amount of time intervening.

The possibility of the occurrence of superfœtation was doubted formerly when it was supposed that the mouth of the womb closed immediately after the occurrence of conception. It has been proved that the mouth of the womb does not close immediately after conception, and that if an egg should happen

to enter the womb, it may become impregnated a month or so after a previous conception. Several well authenticated cases are on record which support the possibility of superfetation.

## CHAPTER II. DELIVERY.

A medical man may be required to determine whether a certain woman was really delivered or not ; for, delivery may be feigned by a woman to disinherit parties who may have claims to an estate, to extort charity, &c. He may be asked to state the time which has elapsed since a woman was delivered, in cases of concealed births, criminal abortion, or infanticide, when a child is found, and when it should be known if the time which has elapsed since the birth of the child corresponds with the supposed delivery of a suspected woman. He may be required to say whether a dead woman was recently delivered, in order to determine the identity of the body, or was pregnant at all to rescue the reputation of the deceased from a charge of unchastity.

In the case of a dead woman, the discovery of an embryo or ~~fetus~~ fetus with its membranes in the womb will at once determine that she was pregnant. But to decide about the other question he should be well aware of the signs of delivery.

**Signs of recent delivery in the Living.**—The skin covering the abdomen will be thrown into folds; and irregular, light, broken streaks (showing previous distension of the abdomen) will be visible. These latter may be found in diseases where the abdomen is distended. The external organs of generation will be found swollen and injured. There will be a discharge from the vagina, more or less bloody in character, for the first three days; dirty green in color during the next four or five days; and yellowish-white for four or five weeks after.

Unless the woman is seen within ten days after delivery, it is difficult, if not impossible, to say how long it is since the occurrence of the event.

**Signs of recent delivery in the Dead.**—The external signs are the same as those just described. Besides, the cavity of the womb may contain large blood clots.

The womb will be found collapsed and flabby. The situation of the attachment of the placenta can be easily seen. The mouth of the womb will be found open.

**Signs of a previous delivery.**—Streaks on the abdomen above described. Similar streaks on the breasts. The os uteri is circular and irregular. The vaginal rugæ have disappeared. Marks of rupture of the perinæum or *fourchette*.

In addition to these signs, the existence of a true *corpus luteum* in the ovaries will determine that a woman was previously delivered.

### CHAPTER III.

## CRIMINAL ABORTION.

The term '*abortion*' is used differently in medicine and in law. In medicine, abortion is said to take place when the contents of the womb are expelled before the sixth month of pregnancy, and the term premature labor is used when they are expelled after the sixth month, but before the full term.

In law, '*abortion*' signifies the expulsion of the contents of the womb at any period of gestation before the full term, thus embracing within its scope both abortion and premature labor, in the medical sense of the terms. It is synonymous with the popular term of '*miscarriage*.' For the purposes of this book we are concerned only with the legal sense of the term.

The following sections of the Indian Penal Code, besides throwing light on the magnitude of the crime, give a clear idea of what is meant by '*criminal abortion*' :—

"Whoever voluntarily causes a woman with child to miscarry shall, if such miscarriage be not caused in good faith for the purpose of saving the life of the woman, be punished with imprisonment of either description for a term which may extend to three years, or with fine, or with both; and if the woman be quick with child, shall be punished with imprisonment of either description for a term which may extend to seven years; and shall also be liable to fine.

"*Explanation*—A woman who causes herself to miscarry is within the meaning of this section." (Section 312, I. P. C.)

"Whoever commits the offence defined in the last preceding section without the consent of the woman, whether the woman is quick with child or not, shall be punished with transportation for life, or with imprisonment of either description for a term which may extend to ten years, and shall also be liable to fine." (Section 313, I. P. C.)

"Whoever with intent to cause the miscarriage of a woman with child, does any act which causes the death of such woman, shall be punished with imprisonment of either description for a term which may extend to ten years, and shall also be liable to fine; and if the act is done without the consent of the woman, shall be punished either with transportation for life, or with imprisonment above mentioned.

"*Explanation*—It is not essential to this offence that the offender should know that the act is likely to cause death." (Section 314, I. P. C.)

The causes of abortion may be natural or violent.

When natural, it generally occurs before the third month of pregnancy. The frequency of natural abortion may be seen from the fact that 'of 2,000 cases of pregnant women examined by Dr. Whitehead of Manchester, the sum of whose pregnancies was 8,681, or 4.38 for each, rather less than 1 in 7 had aborted.'

Abortion is induced by criminal means, generally between the fourth and fifth months; for it is then that the woman is sure that she is pregnant.

Among the natural causes of abortion may be mentioned, (1) death of the foetus, (2) an abnormal condition of its uterine coverings or of the placenta, (3) mental emotions, (4) diseases such as syphilis, small-pox, &c., (5) loss of blood, (6) excessive lactation, and (7) irritation of the rectum or urinary bladder.

The tendency to abortion is greatest at those periods when, if the woman had not become pregnant, she would have menstruated.

The violent causes of abortion may be either accidental or criminal. The causes of accidental abortion do not call for special notice.

**Criminal abortion** may be induced by mechanical or medicinal means.

**Mechanical Means.**—Passing certain instruments or twigs into the cavity of the womb and rupturing the membranes which cover the foetus by violence are the means adopted to produce mechanical abortion.

In this Presidency, the twigs of *Achyranthes aspera*, *Calotropis Hamiltonia*, *Nerium Oleander*, *Plumbago Rosea* and *Euphorbium Nevulia* are commonly used for this purpose.

They are stiffened with thin bamboo sticks, and well anointed with assafoetida paste and then introduced into the womb.

They generally result in the expulsion of the child alive or dead within 15 hours after introduction. It is said that there is no danger to the woman, but that depends upon the skill in the process. If roughly handled, peritonitis may be set up which may soon end fatally. The bruised marking-nut (*Semicarpus anarcardinum*) is sometimes introduced into the womb for the purpose of producing abortion. Mechanical means are more effective in inducing abortion than medicines.

**Medicinal Means.**—Though innumerable are the drugs which are used as abortives, still it is open to question whether any of them do really possess the property. Among the drugs which are reputed to have this quality may be mentioned wood charcoal, capsicum seeds, paupau seeds, carrot seeds, the milky juice of *Calotropis Indica*, assafoetida, savin, ergot of rye, opium, cantharides, unripe pineapple, copper sulphate, arsenic, sulphate of soda, silicate of potassium and tincture of iron. They are all supposed to act on the womb, either directly, or indirectly through the bowels.

Abortion may be feigned for bringing a false charge against another, or with other motives which need not here be considered. In such cases a woman with menses on her may say that the discharge is the result of a violent abortion produced by another. Again abortion may be concealed by a woman who may attribute the staining of her cloth to menstrual discharge. In the present state of knowledge, there are no sure means of distinguishing menstrual blood from other bloods. But in an abortion the blood is generally diluted with the 'waters' (liquor amnii).

It may be necessary to prove abortion in a woman living or dead, for purposes of identity. Therefore it is well to consider the signs of abortion in general.

### Signs of Abortion.

These are practically the same as those of delivery. In the case of the living, if the abortion had taken place in the early months of pregnancy, and if some days had elapsed since the occurrence, there will be some difficulty in recognising the signs. The following are the chief signs which Dr. Shortt found in cases which he examined within about a fortnight after the abortion :—

Relaxation of the vulva and the passages, a patulous condition of the mouth of the womb, presence of the lochial discharge, distended condition of the breasts, milk flowing on pressure, and the general weak state and peculiar appearance of the body.

Criminal abortion seems to be very common in this Presidency, as 306 cases have occurred in the short time of two years. The cause of this has been justly attributed to the prohibition of widow marriage.

It may be required to prove whether abortion was induced by mechanical or medicinal means. A careful examination alone will help in arriving at a conclusion. The previous history must be inquired into—if she is in the habit of using purgatives, or drugs to promote menstruation regularly or occasionally ; for, no criminal intent may exist, though she may have been pregnant. In cases of death, the alimentary canal should be examined for signs of irritant poisons, the internal organs for disease or rupture, the womb and the vagina for injuries, and the ovaries for true *corpus luteum*.

Dr. Taylor says, ‘the discovery of the ovum in the uterus *in process of development* could alone, in the present state of our knowledge, warrant an affirmative opinion on this point in a court of law, and this I believe to be the safest view at present on this much contested question. On the other hand, the absence of a *corpus luteum* from the ovary would not in all cases warrant an opinion that conception had not taken place.’

When from some cause it is deemed necessary to induce abortion, the medical man should satisfy himself that, if left to nature, she would be worse off than if the operation is undertaken, and should hold a consultation, if possible, with another medical practitioner. He should be extremely cautious in giving even the most harmless medicine to a pregnant woman ; or he may render himself liable to great suspicion, if the woman happens to abort.

## CHAPTER IV.

### INFANTICIDE.

By infanticide is meant the murder of a new-born child.

A foetus born before the seventh month is seldom born alive, and the age of the foetus may, when necessary, be ascertained by its *development*.

Between the sixth and seventh months, the child is about 12 inches long, and weighs from 2 to 4 lbs. The membrane of the pupil has not yet disappeared. The nails have not reached the ends of fingers. The skin is covered with soft down and unctu-

ous matter. Meconium is found at the upper part of the large intestines. The brain presents no convolutions.

At full term, the child is about 18 inches long and weighs about 6 lbs. The membrane of the pupil has disappeared. The nails have reached to the ends of fingers. The skin is rosy, and is covered with down only about the shoulders. Meconium is found at the end of the large intestines. The brain presents convolutions. The hair is about one inch long on the head.

The law presumes that every child is born dead until the direct contrary is proved.

Life may be proved by the child having cried or breathed, or performed certain movements, or by its heart having acted.

In law, **Live Birth** means the 'entire delivery of the living child' outside the womb; it does not matter whether the child is still connected with the mother or not by means of the cord. According to English law, it is not murder if the child is killed in its mother's womb, or when it is partially delivered; for the person killed must be 'a reasonable creature in being, and under the king's peace.'

To substantiate a charge of infanticide, two things must be proved:—

1st.—That the child was born alive.

2nd.—That measures were taken to kill the child, or that the child was left to die of starvation, exposure, &c.

### Signs of Live Birth.

Evidences of live birth may be divided into the negative and the positive.

The negative signs are,—

1. Such imperfect development of the foetus that it could not have been born alive, and,

2. Such a putrified state of the child when born that it must have died in the womb.

The appearances showing that a new-born child has breathed, constituting the positive signs, are:—

1. **The position of the diaphragm.**—In children born alive, the highest point of the diaphragm is between the fifth and sixth ribs; whereas in children born dead, it is between the fourth and the fifth ribs. It must be remembered that the position of the diaphragm may be changed by gaseous products of decomposition.

**2. The condition of the lungs.**—When the chest-wall is cut open, the lungs will be found to be distended and almost filling the cavity of the chest, in children who have breathed. When respiration has not taken place, the lungs will be found collapsed.

Lungs which have respired are of a slate-blue color, and more or less mottled with red patches; while lungs which have not breathed are reddish-brown in color and do not present the mottled appearance.

After respiration, the lungs are spongy and crepitate on pressure. Before respiration, they are firm and compact; but this latter condition may be due to disease.

In addition to these signs, the one which is most reliable if perfectly carried out is the 'hydrostatic lung test.'

'*Hydrostatic Lung Test*'.—This test is based on the fact that lungs which have breathed float, while those which have not sink in water. Certain objections are raised to this test, on the ground that respiration may have taken place in the womb, in the maternal passages, or when the head alone has been born, and yet the child may be stillborn. This, however, cannot be maintained, except on speculative grounds, and is of no practical importance. The only plausible objections that may be raised are:—

That the lungs may not have breathed, but may yet float in water as the result of—

- (1) Artificial respiration or
  - (2) Putrefaction;
- and that lungs which have breathed may sink as the result of
- (3) Disease or
  - (4) Imperfect respiration.

The test itself is briefly this,—Throw the lungs with the heart attached in a large basin of water. Throw the lungs without the heart. If on both occasions they float, then compress the lungs well by placing a wooden board on them, and standing on the board. This is done to drive off all the air generated by putrefaction (the air respired can never be completely expelled). If the lungs thus compressed also float, slice off some portions of the lung and squeeze them in a cloth, and throw these pieces in water. If these pieces also float, there is no doubt whatever about the lungs having respired.

Now as to the objections,—

(1) *Artificial Respiration*.—To perform this operation is no very easy task. The lungs can be inflated only by an expert.



Besides the mother has no intention of saving the child. Above all, when artificial respiration has been attempted, there are the presence of air in the stomach and intestines, the bright red color of the lungs without any mottling, and the absence of bloody froth on incision of the lung, to prove the fact that the lungs have been inflated.

2. *Putrefaction*.—The air generated by putrefaction is not found in the air-cells of the lungs, but in the *lobuli* and under the pleuræ. Air due to this cause can be readily removed on pressure. Putrefied lungs do not crepitate. Lungs putrefy very late.

3. *Disease*.—The diseased condition is easily detected. It is not probable that every portion of the lung would be affected by the disease, and some portions at least should float.

4. *Imperfect Respiration*.—This objection does not militate against the general application of the test, for in such cases there is no known test by which the presence or absence of respiration can be settled.

Casper says that a child has certainly lived during and after its death :—

(1) When the diaphragm stands between the fifth and sixth ribs.

(2) When the lungs more or less completely occupy the thorax, or at least do not require to be sought for by artificial separation of the walls when cut through.

(3) When the lungs are found by careful experiment to be capable of floating.

(4) When the ground color of the lungs is broken by insular marblings.

(5) When bloody froth flows from the cut surface of the lung on slight pressure.

The lung test is unnecessary when the funis has fallen off and scar has resulted, or when the stomach contains food, or when the signs of putrefaction *in utero* are evident.

### Evidence as to the cause of death of the child.

The causes of death in a new-born infant may be—

- (1) Natural or accidental, or
- (2) Criminal.

*Natural or Accidental Causes.*—The child may die soon after birth, in spite of all attempts to make it live. In many of these cases death seems to be due to an imperfect development of the child, or to its general weakness, or to some congenital disease, especially of the lungs. The child may die as the result of compression of its head when the maternal passages are narrowed by tumors or disease of the bones. Death may take place from an unusually large size of the child's head, or from pressure on the umbilical cord due either to a protracted delivery or malposition of the child. The child may die from suddenly falling on the ground in precipitate labors, or from accidental strangulation by the funis during delivery, or from suffocation by the mother's fæces or bed clothes, or from hæmorrhage from the navel string.

*Criminal Causes.*—Among the violent modes adopted to commit infanticide may be mentioned suffocation, strangulation, throttling, drowning, wounding, poisoning, starvation, and exposure.

It is not always easy to decide whether a child had died from the effects of violence or not. A woman may do harm to her child by dragging it from her, without any intention of injuring the child. Moreover some accidental causes may simulate violence, as for instance fractures of the skull due to falls. But in all these cases there will be ample circumstantial evidence to decide the nature of the case.

When the injury is due to a fall of the child in precipitate labors, either the placenta is found attached to the child, or the umbilical cord is ruptured. If, however, the navel string is clean cut, and there are other incised wounds on the body, or extensive injuries to the bones of the skull or neck, it is suggestive of violence having been used.

In strangling, throttling and suffocation, the amount of violence used is out of all proportion to that requisite to kill the child; and the marks of such violence are invariably present to indicate what has happened. When the strangulation is produced by the navel-string, the mark round the neck is broad and interrupted, and corresponds with the breadth of the cord; while the opposite conditions obtain, besides abrasion and parchment-like discoloration of the cuticle if harder materials had been used.

In cases of poisoning, the examination of the stomach and other organs will throw light on the case.

When the child had been drowned, the *post-mortem* appearances are characteristic. As regards starvation, exposure and other

modes of neglect, Section 317 of the Indian Penal Code says that, 'Whoever being the father or mother of a child under the age of 12 years, or having the care of such child, shall expose or leave such child in any place with the intention of wholly abandoning such child, shall be punished with imprisonment of either description for a term which may extend to seven years, or with fine, or with both.'

*Explanation*—This section is not intended to prevent the trial of the offender for murder or culpable homicide as the case may be, if the child die in consequence of the exposure.'

It will thus be seen that infanticide is not regarded a specific crime, and is tried by the rules of evidence as applied to murder or culpable homicide.

When a charge of infanticide cannot be maintained, the woman may be charged for concealment of birth under Sec. 318 of the Indian Penal Code, which lays down that 'whoever, by secretly burying or otherwise disposing of the dead body of a child, whether such child die before or after or during its birth, intentionally conceals, or endeavours to conceal, the birth of such child, shall be punished with imprisonment of either description for a term which may extend to two years, or with fine, or with both.'

## PART V.

### IMPOTENCE AND STERILITY, RAPE AND UNNATURAL OFFENCES.

#### CHAPTER I.

### IMPOTENCE AND STERILITY.

A medical man may be asked whether a person is capable or incapable of sexual intercourse in charges for rape, in divorce suits, and in cases of contested legitimacy. In such cases he should not commit himself to a positive opinion and assert that impotence or sterility exists, except on the most certain grounds.

The causes of impotence and sterility may be either functional or organic.

#### CAUSES OF IMPOTENCE IN THE MALE.

*Functional Causes.*—Certain enervating diseases, masturbation, sexual excess, and drunkenness.

*Organic Causes.*—Malformation of the penis, deficiency in the length of the penis, malformation of the urethra (epispadias or hypospadias), and diseases such as cancer or atrophy of the testicle. Absence of the testicles in the scrotum is no bar to procreation; for cryptorchides have been known to be able to beget children.

#### CAUSES OF STERILITY IN THE FEMALE.

*Functional Causes.*—Difficulty in menstruation, profuse or suspended menstruation, leucorrhœa and hysteria.

A case is known in which an attack of hysteria was brought on whenever sexual intercourse was attempted.

It must be remembered that a woman who is sterile with one man may become pregnant with another. Dr. Husband gives an interesting case of 'two men who, travelling together with their wives to drink the waters of a celebrated spring on the continent, accidentally and unconsciously changed wives at an inn, when both wives became pregnant.' Both these women had not become pregnant, though they were married several years.

*Organic Causes.*—Absence of vagina, uterus or the ovaries; certain diseases of the vagina; imperforate hymen, and tumours of the vagina, uterus, &c.

## CHAPTER II.

### RAPE.

**What is Rape?** According to Sec. 375 of the Indian Penal Code, a man is said to commit "rape" who has sexual intercourse with a woman either against her will, or without her consent, or with her consent when it has been obtained by putting her in fear of death or of hurt, or with her consent, when the man knows that he is not her husband, and that her consent is given because she believes that he is another man, to whom she is or believes herself to be lawfully married, or with or without her consent when she is under ten years of age, except in the case when sexual intercourse is had by a man with his own wife, unless she is less than ten years old.

Formerly emission of semen into the vagina was necessary to constitute rape. Now, mere penetration is sufficient to constitute the sexual intercourse necessary to the offence of rape. If the penis is lodged within the vulva, that is sufficient; it is not even necessary that the hymen should be ruptured.

**About rape in general.**—In England, a boy under the age of fourteen years is presumed by law to be incapable of committing rape. Evidence adduced to his having attained puberty and to his being able to perpetrate the crime is not admissible in that country. The age when a person is capable of committing rape ought to be a question of proof, and not of theory.

In England, children seem to be the unfortunate victims of this crime. This is explainable by the erroneous idea prevalent among the common people of that country that an attack of gonorrhœa may be cured by having connection with a virgin or

healthy female. The results of 136 cases examined by Casper are as follow :—

|                             |     |     |     |
|-----------------------------|-----|-----|-----|
| From 2½ to 12 years old ... | ... | ... | 99  |
| „ 12 to 14 „ „ ...          | ... | ... | 20  |
| „ 15 to 18 „ „ ...          | ... | ... | 8   |
| „ 19 to 25 „ „ ...          | ... | ... | 7   |
| 47 „ „ ...                  | ... | ... | 1   |
| 68 „ „ ...                  | ... | ... | 1   |
|                             |     |     | 136 |

The medical man should not omit to make a careful note of every minutest detail, for it is in such cases that apparently unimportant signs become of great moment. The female should be given no time for preparation for the examination. But the medical man may render himself liable for an action for assault, and may have to pay heavily for his zeal, if he uses any force. The time of the visit and of the alleged offence, the age, state of health and strength of the woman should be noted. No leading questions should be asked. The organs of generation, the body and limbs and the cloths worn should all be minutely examined. The relative strength of the parties may have to be considered. Every case of rape, therefore, should be judged on its own merits. In all cases of alleged rape, the medical man's duty ends when he proves that sexual intercourse has or has not taken place, and it should be left to the court to decide whether a rape has been committed or not.

Rape is not possible in a virgin during natural sleep, though it may be committed on a woman accustomed to sexual intercourse. It is quite possible for a woman to become pregnant in consequence of a rape perpetrated on her; for it is not at all necessary that she should experience any pleasurable sensation during connection in order that she may conceive.

‘The party ravished is a competent witness to prove the case. But the credibility of her statements must be left to the court.’ Authorities differ as to whether her character can be questioned or not, and if the accused can give evidence of her profligate and abandoned life. But he may adduce evidence as to his previously having had connection with her.

With a view to the clear understanding of the signs of rape, it will be well to consider in this place the signs of virginity.

**Virginity.**—The presence of the hymen was formerly considered as a sign of virginity. But it has been proved that it is not so, its very existence being denied by some scientific men of eminence. Instances are not wanting of women who have become pregnant with the hymen unruptured. A woman in whom it is absent should not be pronounced to be unchaste, for it has been known to give way in certain cases as the result of accident (during kicking, &c.) ; or it may be absent as the result of certain diseases which corrode the membrane away, or as the result of some surgical operation performed to give exit to retained menses.

Casper says that ‘where a forensic physician finds a hymen still preserved, even its edges not being torn, and along with it—in young persons—a virgin condition of the breasts and external genitals, he is then justified in giving a positive opinion as to the existence of virginity and *vice versâ*.’

### Signs of Rape.

Severe injury to the genitals is a presumption in favor of rape. In children this is always very marked, and lasts for some days. In those who have been previously deflowered, there may be no traces at all, especially if the woman is examined some days after the occurrence. The redness and abrasion of the lining membrane of the part may closely resemble the irritation due to catarrh and is apt to mislead. Marks of blood are always found in adults when the vessels of the hymen are ruptured for the first time. Lacerations of the hymen are found especially in young girls if examined within four or five days after the event, and they soon heal up.

If the person who committed rape had gonorrhœa, the girl may become infected with the disease. But the whitish discharge from her vagina might be due to leucorrhœa, which is by no means uncommon among children, or to the muco-purulent secretion from the vagina, the result of wilful irritation caused to the parts to substantiate a false charge of rape. These conditions should not be mistaken for gonorrhœa. If he has been the subject of syphilis, she may be infected with the poison.

The presence of spermatozoa in the vagina of a woman is a sure sign that sexual intercourse has taken place, but not of rape. When rape is committed on a girl there will be difficulty in walk-

ing, passing urine, &c.; but these will be of no value in the majority of cases that come before the court.

Dilatation of the vagina may be the result of hard bodies being passed, or of pith being thrust into the vagina and water poured into it to swell the pith, in order to substantiate a false charge of rape.

Little value should be placed on slight injuries on the body of the woman, for they may be self-inflicted. In children, they do not generally occur, except when imposture has been practised as they cannot offer any resistance.

Charges of rape brought by respectable parties are mostly true, as it is not to their interest and consistent with their position to bring charges of rape even when it has been perpetrated.

An examination of the cloths should always be made. When false charges are brought, the cloth may be intentionally stained with blood, menstrual or otherwise. When the red juices of fruits, &c., are used, they may be easily detected. (See blood-stains.)

The microscope is the only reliable test, for the detection of spermatozoa; but great care is needed in manipulation. The suspicious part on the cloth should be carefully cut out and placed in a clean watch glass, and moistened with a small quantity of distilled water. After 15 minutes, the cloth should be gently moved about with a glass rod. The cloth should not be rubbed between the fingers, or in any way roughly handled, as by so doing harm may be done to the spermatozoa. A single drop of water squeezed on to a clean slide and placed under the microscope will exhibit the spermatozoa recognized by their characteristic appearance. They should not be mistaken for *trichomanas vagina*.

**Rape by Females on Males.**—This crime is unknown to the English and the Indian law. But Taylor says that there is no doubt that this crime is committed in England. It seems to be not uncommon in France. In that country a girl aged 18 years was some time ago 'charged with rape on two children—the one 11, and the other 13 years of age.' It appeared in evidence that the accused enticed the two boys into a field, and there had forcible connection with them. This female was proved to have had a preternatural contraction of the vagina, which prevented intercourse with adult males. She was found to be laboring under syphilitic disease, and the proof of her offence was completed by the disease having been communicated to the two boys. She was condemned.'



## CHAPTER III.

**UNNATURAL OFFENCES.****Sodomy, Buggamy, Pedarastia :—**

Sodomy signifies *unnatural* intercourse between man and man or between man and woman. Buggamy (bestiality) implies *unnatural* intercourse with animals. Pedarastia comprises those cases in which boys at the age of puberty 'are made the victims of the depraved passions of men.' In cases of buggamy, the hair or fæces of the animal on the body or clothes of the person affords valuable evidence.

To constitute these crimes, penetration is sufficient. Both parties are equally guilty, if the person on whom it was committed had consented. It is said that the crime cannot be committed on a person when he is asleep. With regard to these crimes, section 377 of the Indian Penal Code runs thus:—"Whoever voluntarily has carnal intercourse against the order of nature with any man, woman, or animal, shall be punished with transportation for life, or with imprisonment of either description for a term which may extend to ten years, and shall also be liable to fine."

## PART VI.

# INSANITY AND LIFE INSURANCE.

### CHAPTER I.

## INSANITY.

In relation to the criminal responsibility of individuals, this subject is of considerable importance in forensic medicine. Any detailed account of this important and interesting subject can scarcely find a place in this little manual. A few brief remarks on its several forms, with some reference to its legal relations, will here be made.

It is extremely difficult, if not impossible, to give an accurate definition of insanity; and the philosophic caution of Polonius when addressing Hamlet's mother may well deter any one from attempting a definition:—

“Your noble son is mad,  
Mad call I it; for, to define true madness,  
What is't but to be nothing else than mad.”

The opinion laid down by English lawyers is that madness absolves from all guilt in criminal cases.

The fact of the soundness or unsoundness of the accused at the time when the crime is alleged to have been perpetrated should be left for the court to decide, guided by his past and present conduct.

The legal opinion is that the soundness or unsoundness of an individual has to be decided on the ordinary rules of daily life, and that on these matters lawyers are as good judges as medical men; and the tendency of the legal practice seems to be to completely ignore medical evidence in these cases. About medical evidence in cases of insanity, Justice Doe remarks: ‘At present, precedent require the jury to be instructed by experts in new

medical theories, and by judges in old medical theories,' and that in this 'the legal profession were invading the province of medicine, and attempting to install old exploded theories in the place of facts established in the progress of scientific knowledge. If the tests of insanity are matters of law, the practice of allowing experts to testify what they are should be discontinued: if they are matters of fact, the judge should no longer testify without being sworn as a witness, and showing himself qualified to testify as an expert.'

To excuse a man from punishment on the ground of lunacy, the old guidance was that he should not know what he was doing, 'no more than an infant, than a brute, or a wild beast.' Later on, the test became whether the person was able to distinguish between right and wrong. At present, it must be proved that the person was incapable of distinguishing right from wrong with reference to the particular action of which he is accused, and 'that he did not know at the time of committing the crime that the offence was against the laws of God and nature.'

The latest definition of unsoundness of mind seems to be this:— 'Imbecility and loss of mental power, whether arising from natural decay, or from paralysis, softening of the brain, or other natural cause, and although unaccompanied with frenzy or delusion of any kind.'

Lord Coke included four classes under the term '*non compos mentis*':—

1. Idiot which from his nativity, by a perpetual infirmity, is *non compos mentis*.

2. He that by sickness, grief, or other accident, wholly loseth his memory and understanding.

3. A lunatic that hath sometimes his understanding and sometimes not, *aliquando gaudet lucidis intervallis*, and therefore he is called *non compos mentis*, so long as he hath not understanding.

4. He that by his vicious act for a time depriveth himself of his memory and understanding, as he that is drunken.

If a mad man understands the nature of an oath and of the character of the proceedings in which he is engaged, he is considered as a competent witness in relation to testimony as in relation to crime. Under these circumstances, a lunatic may, according to Mr. Fitzjames Stephen, give evidence during a lucid interval, while an idiot shall not be allowed to give evidence.

In civil questions, the law does not consider whether a person is sane or insane. To render a will valid, what the law wants is that the person should have 'a disposing mind,' i.e. he should be able to dictate the conditions and should be aware of its consequences. Bodily diseases do not render a will invalid, unless the mind is directly or indirectly affected by such disease. The mere presence of a delusion in the mind of a person does not vitiate a deed, unless it can be distinctly proved that his mind was influenced by it at the time of executing the deed. Wills made while the person is dying would be rendered invalid, unless the dying person is able to dictate and accurately repeat, if necessary, the provisions of the deed.

### EXAMINATION OF INSANE PERSONS.

The family and the personal history should be clearly traced out. The general appearance of the person as regards the size and shape of the head, speech, movements, expression of countenance, &c., should be noted. The general health, and in women, any disorders connected with menstruation, should be minutely and carefully inquired into. Simple questions may be asked to ascertain the capacity of the mind, considering the surroundings and the possible degree of his mental culture. The presence or absence of a well designed plan of action is of no practical value. It should be ascertained whether the act was spontaneous and was the only one of the kind in his life, and whether there was any motive for the perpetration of the crime, and whether he had taken any measures to escape punishment. It should be remembered that a dominant delusion may be so concealed as not to be discovered for a time, and that persons who may behave comparatively well in a lunatic asylum become ferocious, violent and abusive when brought back to the midst of their relations, and that some forms of madness have lucid intervals.

The classification of insanity, according to Dr. Guy, is as follows:—

### • UNSOUNDNESS OF MIND.

1. Amentia.
  - a. Idiocy.
  - b. Imbecility.
  - c. Cretinism.
2. Dementia.
  - a. Acute.

- b.* Chronic.
- c.* Senile.
- d.* Paralytic.
- 3. Mania.
  - a.* General.
  - b.* Intellectual.
    - 1. General.
    - 2. Partial.
  - c.* Moral.
    - 1. General.
    - 2. Partial, including homicidal mania, suicidal mania, kleptomania, erotomania, pyromania, dipsomania, and puerperal insanity.

### AMENTIA.

Idiocy constitutes the *dementia naturalis* of lawyers. An idiot is defined by law to be 'one who is of non-sane memory from his birth by a perpetual infirmity, without lucid intervals.' Idiocy, therefore, differs from other forms of insanity in the fact that it is a congenital defect of the intellectual faculties due to defective structure, and not to a loss or perversion of what was once developed. In the idiot the mind is vacant, the expression meaningless, the look bewildered, the head ill-formed and very small, the power of speech not developed, and the movements awkward and unsteady.

When this state of the body and mind is associated with an enlarged state of the thyroid gland, the term cretinism is applied.

Imbecility differs from idiocy in that it is not congenital, but commences in infancy. In the imbecile, the faculty of speech may be developed.

An absolute idiot or imbecile is civilly disabled and irresponsible. But it is not settled whether these are responsible for crimes. Mr. F. Stephen maintains that an idiot shall not be allowed to give evidence.

### DEMENTIA.

Dementia differs from amentia in the fact that, in it, the mental derangement occurs late in life, when the mind has become fully developed; whereas in amentia, the defect is congenital.

Esquirol says that 'a man in a state of dementia is deprived of advantages which he formerly enjoyed. He was a rich man who has become poor. The idiot, on the contrary, has always been in a state of want and misery.'

In the first stage of dementia, events that take place around the person produce no impression on him. He becomes forgetful. As the disease advances, the reasoning faculty gradually diminishes, the person becomes incapable of coherent reasoning and comprehension, until finally the miserable sufferer merely lives, without even being conscious of his very existence.

Dementia may be either acute or chronic. Acute dementia may result from a sudden severe mental shock, and the person becomes very dull and melancholy. Chronic dementia generally comes on as a result of prolonged severe bodily pain, great anxiety, brooding over grief, or of certain diseases such as paralysis and epilepsy.

Senile dementia is a condition the result of old age and characterized by the memory being frail, the perception dull, power of attention lost, reasoning faculty gradually deadened, until the person comes to live a bare existence.

Paralytic dementia, otherwise called general paralysis of the insane, is a condition which is accompanied with progressive physical and intellectual deterioration. The subjects of this disease often fancy that they have attained to high positions or have amassed enormous wealth.

They have absurd delusions; paralysis gradually comes on, the speech becomes indistinct and thick, the sphincters do not act, and death results from suffocation.

## MANIA.

The several varieties of insanity which are accompanied with mental excitement, in some cases amounting to violent fury, are usually put down under mania.

**General Mania.**—The patient's general health is first impaired, his liver gets sluggish, and his bowels constipated. He then becomes violent; the violence being directed either against himself or against others. The eyes have the characteristic wild look. He is restless, tears off his clothes, either refuses food or eats greedily, and undergoes a good deal of muscular exertion without apparent exhaustion.

**General Intellectual Mania.**—In this condition, the intellect alone is seldom attacked; the passions and the emotions being alike perverted. It has been divided by some writers into mania and melancholia.

In mania, the mind is in the most confused state; the patient is violent and excited; he laughs immoderately, and then becomes quiet and pensive; he is the subject of wild delusions, and may act in the most extraordinary manner.

In melancholia, the tendency to suicide is very great. The person may be the subject of strange illusions; but delusions may be absent or difficult to detect, which are never so in mania. The patient is sleepless and gloomy; when questioned he answers correctly and briefly; but again relapses to his gloomy condition.

**Partial Intellectual Mania.**—Or monomania is a disease in which the patient has some one absurd and queer notion preponderating in his mind; for instance he may fancy that he is made of glass, and that if he walks he will fall down and break himself, or that his bowels are full of birds.

**General Moral Mania.**—This condition is defined by Pritchard as ‘a morbid perversion of the natural feelings, affections, inclinations, temper, habits, moral dispositions, and natural impulses, without any remarkable disorder or defect of the intellect, or knowing and reasoning faculties, and particularly without any insane illusion or hallucination.’

**Partial Moral Mania.**—In this form of mania, there is a perversion of one or two of the moral powers, and it has several varieties:—

**Homicidal Mania.**—The subject of this disease has an uncontrollable propensity to murder.

**Suicidal Mania.**—The condition of the mind in which a person has a great tendency to commit suicide is considered by some authorities to be always an indication of insanity.

**Puerperal Mania.**—In this form of insanity, which attacks some women shortly after delivery, there is a strong tendency in the woman to kill her child. Most of these cases are cases of melancholia.

**Kleptomania.**—In this variety of mania there is a strong tendency to commit theft.

**Pyromania.**—In this form there is an intense desire to set fire to everything.

**Eratomania.**—This is an inordinate desire for sexual intercourse. When males are subject to this condition, it is called *satyriasis*. When it occurs in females it goes by the name of *nymphomania*.

**Dipsomania or Drunkenness.**—This state, which in law is known as *frenzy*, is for legal purposes divisible into two stages,—partial drunkenness and total drunkenness.

In partial drunkenness, the person is supposed to be capable of giving a rational consent. Any deed or agreement made by a person while in this state is not rendered invalid by English law.

In total drunkenness, the person is supposed to have no knowledge of any transaction, and therefore incapable of giving rational consent. Deeds or agreements or other civil acts of a person in this state are consequently invalidated by law.

A statement made by a drunkard in whatever state is admissible in law, provided it be confirmed by circumstances. Though total drunkenness renders the civil act of a person invalid, yet if he perpetrates a crime during such a state he is responsible for it. If, however, he is subject to an illusion and commits a crime while under the influence of that illusion, he is not responsible for it.

**Delirium Tremens.**—This is a temporary form of insanity brought on by habitual drunkenness. The patient is the subject of horrible illusions and hallucinations, and prone to commit suicide or murder. Persons suffering from this disorder are irresponsible for civil and criminal acts performed by them while subject to the attack. •

Likewise, criminal acts done during **simple delirium** do not render the individuals liable to punishment. But wills, &c., made during this disorder, if consistently made, are valid. In all civil cases, the law looks to the good sense of the will, deed or agreement.

**Somnambulism** (*Sleep-walking*).—In medical jurisprudence it is applied to a state of ‘unconscious cerebration during sleep.’ The two chief factors which constitute crime, malice and intention, are wanting in acts done during this state.

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active and persistent in some persons than in others ; but it is difficult to suppose, unless we imagine there is a sudden access of insanity, that a person should not recover from the delusion before he could perpetrate an act like murder.' It is therefore impossible to lay down any rules on this subject ; every case that turns up should be decided on its own merits.

### **Feigned Insanity.**

Insanity may be feigned after the perpetration of a crime, to escape punishment. The form of insanity usually feigned is mania, as the popular opinion is that a mad man is generally violent and ferocious. It is not very difficult to detect the fraud.

The maniac's restlessness continues through day and night. The impostor is tired after some exertion.

The maniac's sleep is restless and disturbed. The impostor sleeps soundly.

Maniacs never express that they are mad, and contradict or abuse those who call them mad. All the attempts of an impostor are to prove that he is mad.

Real mania never comes on suddenly ; but it is invariably preceded by premonitory symptoms.

A maniac does not heed the words of others ; whereas an impostor can be made to do any act, if it be observed in his hearing that the committal of such an act would be clear proof of his madness.

The maniac is violent whether alone or not. The impostor is violent when he knows he is observed.

The look of the maniac is characteristic and cannot be assumed by an impostor.

## **CHAPTER II.**

### **LIFE INSURANCE.**

The Right Honorable Mr. Dodson, M.P., said that "among the many wonderful discoveries made towards the end of the last and the beginning of the present century, and which had great influence upon the progress of civilization, was one which was less startling in its immediate effects, but which, perhaps, was destined to produce results scarcely, if at all, inferior to those produced by any other. That discovery was the discovery of Life Insurance."

**What is Life Insurance?**—It is “a contract whereby the insurer, in consideration of a certain sum of money called a premium, either in a gross sum or in periodical payments—proportioned to the age, sex, profession, health, and other circumstances of the person whose life is insured—undertakes to pay to the person for whose benefit the insurance is made a stipulated sum, or an equivalent annuity, upon the death of the individual whose life is insured (or on his obtaining a certain age), whenever this event shall happen, if the insurance is for the whole life; or in case this shall happen within a certain period, if the insurance is only for a limited sum.”

The deed by which this contract is made is called a ‘policy.’

The amount for which an individual’s life has been insured cannot be recovered until after his death; and those who would profit by the death, must prove the fact of death, when there is reason to doubt it.

If the insured has committed any fraud, by hiding any disease or disorder from the insurers, the contract will be void and the amount of the premium forfeited.

The medical man’s opinion as regards the health, habits, &c., of the person who desires to have his life insured, is always taken by the insurers. Thus the responsibility of causing the life to be accepted or rejected is entirely thrown on the medical man. He should therefore be cautious in giving his opinion, as by a mistake on his part great injury might be done to the party concerned as well as to his own professional reputation. It is consequently necessary to have a knowledge of the several factors which ought to be taken into consideration before deciding whether a person’s life should be recommended or not.

**“Diseases tending to shorten life.”**—It is impossible to say definitely what diseases tend to shorten life and what do not. A disease which has a tendency to shorten life does not mean one that rapidly destroys life; but it simply signifies one of so serious a nature in the medical opinion as to shorten the duration of life directly or indirectly. It is upon the meaning of these words that litigation commonly turns. The following maladies have according to Taylor, a tendency to shorten life:—

‘Affections of the head, apoplexy, palsy, epileptic or other fits, disease of the brain, insanity, disease of the lungs, spitting of blood, asthma, inflammation, disease of the heart, dropsy, diseases of the bowels, liver, kidneys, or urinary organs, gout, rheumatism, hernia, phthisis or an any hereditary malady.’

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**Habits.**—Certain habits such as drinking, opium-eating, tobacco-smoking, &c., may give rise to questions of importance. Any of these habits, if moderately indulged in, may not prove very detrimental to health, and may not be included under conditions which tend to shorten life. But drunkenness, abuse of tobacco and excessive indulgence in the use of opium, do impair health to a very great extent, and consequently have a tendency to shorten life. A concealment of any of these habits may render a policy void. It is, therefore, incumbent on the medical man to let the insurer know the existence of any such habit in the person who wishes to have his life insured. A neglect of this precaution is very likely to give rise to future litigation.

**Insanity.**—Formerly it was believed that insanity had a tendency to prolong life; but statistics have proved that this belief has no foundation in fact, and that, on the other hand, mad men are more prone to certain diseases than sane men, and that they more easily succumb when attacked, and that the death-rate among the insane is higher than that of the sane. The concealment of insanity or even of a hereditary tendency to insanity may render a policy void.

**Suicide.**—Many insurance companies stipulate in the contract that the policy shall be void if the insured commits suicide.

In cases of sudden death, whether natural, homicidal or otherwise, it must be clearly proved that the person did not commit suicide in order that the representatives of the insured should benefit by the premium, if the insured had died under a policy containing this condition.

**Insurance Murders.**—Objections have been raised to the practice of insuring the lives of others, inasmuch as it tends to create an interest in the death of a person and thus lead to secret murders. Infants seem to be murdered very frequently for realizing the premium for which their lives were insured. The following article which appeared in a recent number of the *British Medical Journal* throws much light on the abuse of child-life insurance in England:—

“Fresh facts come to hand which point to the urgent necessity for putting a stop to the iniquitous system of child-life assurance as at present conducted. A recent case is that of Mr. and Mrs. Price, who have just been sentenced by the Rotherham police magistrates to three months’ imprisonment each with hard labor.

“Starved, neglected, ill-treated to a degree far too horrible to be related here in detail, the six little children of these inhuman parents were yet insured in various sums. In one case, an infant had been doubly insured. In another a sum of £9-18s. hung upon the frail life. For what good object, it may well be asked, could these improvident parents have been so provident as to pay little premiums periodically to the Insurance Society’s agents? It could not be for the children’s benefit, for they must die before these little seed-sowings could yield any harvest. It could not be to console or compensate the survivors for their loss; for of natural affection it is only too clear that they had none, and the death of a child to such persons is, materially speaking, simple relief from a burden. Sometimes it is said that the insurance money ‘pays for mourning.’ A more plausible pretext is the cost of a funeral; but what parents who starve, neglect, and brutally illuse their offspring would be likely to spend £9-18s. on the funeral of a child or on mourning for it? Clearly there is but one word which can throw light upon the motives which lead such horrible parents to insure their children’s lives. The word is ‘murder’—whether direct or indirect matters little.”



## PART VII.

### POISONS AND CHEMICO-LEGAL EXAMINATIONS.

#### CHAPTER I.

#### GENERAL REMARKS ON POISONS.

**Definition.**—The Indian Penal Code does not define what a ‘poison’ is; nor is it necessary to define it for legal purposes, as the administration of any substance, whether poisonous or not, with the intention of doing harm to a person, is punishable under the Code. If one is deemed necessary, the following definition given by Dr. Husband may be adopted :—

“Any substance which, introduced into the system or applied to the body, is injurious to health and destroys life, irrespective of temperature or mechanical means.”

**Classification.**—Poisons have not yet been satisfactorily classified, though several attempts have been made to do it. The following is the one adopted by Dr. Guy:—

- I. Inorganic—
  - a. Corrosive.
  - b. Irritant.
- II. Organic—
  - a. Irritant.
  - b. Affecting brain.
  - c. „ spinal cord.
  - d. „ heart.
  - e. „ lungs.

This elaborate classification would be unnecessary and extravagant for the purposes of this book, and so a much simpler one will be adopted.

## Poisons.

a. Inorganic.

b. Organic.

1. Vegetable.

2. Animal.

The substances commonly used in this Presidency for purposes of poisoning are,—arsenic, mercury, oleander, dhatura, gunjah, opium, nux-vomica and plumbago.

**Modifying Causes.**—It will be necessary to consider briefly in this place the several causes which modify the action of poisons.

1. **Quantity.**—A large quantity of a poisonous substance causes death more rapidly. The action of certain poisons is different when given in large quantities from what it is when administered in smaller ones, *e.g.*, oxalic acid acts as a corrosive in large doses, while in smaller doses it affects the brain, the spinal cord and the heart. Certain poisons may be administered in small doses for a number of days without harm, and then the poisonous symptoms may show themselves. Such poisons are said to have a ‘cumulative effect.’

2. **Form.**—Poisonous solutions are more rapidly fatal than powders or pills, &c., the absorption being quicker when the poisons are in a dissolved state. If largely diluted, however, their virulence may be lessened.

3. **Disease.**—In certain cases this increases the power of a poison, while in others it lessens it.

4. **Habit.**—Generally lessens the action of poisons.

5. **Idiosyncrasy.**—Some persons have an increased susceptibility to the action of some substances, while little or no impression is made on others by large doses of the same substance.

6. **Channel.**—Substances administered hypodermically act more rapidly than when administered by the mouth.

## EVIDENCE OF POISONING.

This may be divided into :—

1. Material evidence and

2. Moral evidence.

### **Material Evidence.—**

**1. Evidence from Symptoms.**—Symptoms of poisoning are generally sudden in their onset, and show themselves in persons who are in good health soon after partaking of a meal, drink or medicine, except in those rare cases of slow poisoning, where the substance is so administered as to make it look like disease. But it must not be forgotten that several diseases such as cholera are very sudden in their attack.

**2. Appearances after Death.**—These are usually characteristic of the class of poison which has been administered, and will be described under the several poisons.

**3. Experiments on Animals.**—These are generally made on the dog or the cat, they being the animals which most closely resemble man with regard to the action of poisons. They are usually valuable, but should be regarded as only corroborative and not as conclusive evidence.

**4. Chemical Analysis.**—As the actual detection of a poison in the body must carry great weight, this constitutes the most important and conclusive form of evidence. In the case of the living, the poison may be looked for in the urine, in extracted blood, or in the serous fluid produced by applying a blister. In the dead body, the poison may be discovered in the internal organs, the muscles, the blood and the secretions.

**Moral Evidence.**—The conduct of persons will afford evidence on this head; for instance, a man may have removed certain substances such as vomited matter, &c., which might have been examined; he might have been in the way of getting competent medical aid to the deceased, or he might have recently bought certain poisonous substances.

**Duties of a medical man in suspected cases of Poisoning.**—If a medical man is called to see a case of suspected poisoning, he must proceed with two objects in view :—

1. To save the life of the patient.
2. To aid the ends of justice.

**To save the Life.**—The treatment of poisoning may be arranged under three heads :—

- a. To remove the poison from the system.
- b. To stop its further action.
- c. To keep up life, so that the patient may recover after the poison is eliminated from the system.

The poison may be removed from the system, either by the use of the stomach-pump or by the administration of emetics.

The stomach-pump should not be indiscriminately used in all cases of poisoning, as the injudicious use of it will cause great harm.

To excite vomiting, the fauces might be either tickled with a feather or with the fingers; or, a tumbler of warm water with two spoonsful of mustard might be frequently repeated, or about six drams of ipecacuanha wine, or 10 grains of copper sulphate, or 20 grains of zinc sulphate, or the hypodermic injection of apomorphine (2 to 5 minims) may be given. The emetics given here are arranged in the ascending order of their strength. The dose given is for adults.

To stop the further action of the poison, the administration of an antidote is necessary.

To keep up life attempts should be made to promote the secretions with a view of eliminating the poison, to mitigate the symptoms by palliatives, and to keep the patient roused by means of stimulants and galvanism, and in cases of narcotic poisoning by walking him about.

### To aid the ends of Justice :—

For the several points that ought to be noted and inquired into in cases of suspected poisoning, either when called to a patient or when called to see a dead body, the reader is referred to the chapter on Experimental evidence.

The *post-mortem* examination should be conducted as carefully and minutely as possible, and as early after arrival of the body in the hospital as practicable.

The detection of the poison is the duty of the Chemical Examiner, and the duties of the medical man with reference to him are detailed in the chapter on chemico-legal examinations. It may here be observed *en passant*, that there are several poisons, especially of organic composition, which are as yet undiscovered and unknown, and several cases of this unidentified class have been reported by the Chemical Examiner of this Presidency.

## CHAPTER II.

## INORGANIC POISONS.

## NITRIC, HYDROCHLORIC AND SULPHURIC ACIDS.

Poisoning by these substances is very rare in this country; but they are of common occurrence in England. It is nevertheless desirable to consider them briefly, as these acids are nowadays commonly used for chemical experiments, for external application to scorpion stings and snake bites, and for filling ice machines, and as they might possibly be used, or rather, misused, for purposes of poisoning.

**Symptoms of Poisoning by these Acids.**—As soon as any of these acids is swallowed, there is severe burning pain along the gullet and in the stomach. The person constantly retches and vomits a dark-brown or blackish matter which contains blood, mucous, epithelium, or the mucous membrane of the gullet and the stomach. The lips and the inside of the mouth and the tongue are all corroded; his bowels get constipated, and urine is not secreted, or secreted in very small quantity. He becomes exhausted, and may die of suffocation, convulsions or collapse.

If he recovers from the immediate effects of the poison, stricture of some portion of the alimentary tract ensues, and he may die of starvation.

**Post-mortem Appearances.**—All parts of the alimentary canal with which the acid has come into contact are corroded and shrivelled up. The stomach is found distended with gas and a sticky fluid matter; the blood in the large vessels of the stomach may be clotted. When the stomach is perforated, the perforation is circular, and on the posterior wall of the stomach; and its margins are inflamed.

**Fatal dose for an Adult.**—One dram of sulphuric acid, two drams of nitric acid, and four drams of hydrochloric acid.

**Treatment.**—The stomach-pump should never be used in these cases, as the stomach wall is corroded and rendered very soft by the action of the poison. When the acid causes difficulty of breathing by having escaped into the air-passages, tracheotomy may have to be performed.

**Antidotes.**—Chalk, calcined magnesia, or sodium carbonate or bicarbonate should be given mixed with oil, milk, or mucilaginous liquids such as solutions of gum acacia or tragacanth in water.

## ALKALIES.

### Potash, Soda, and Ammonia.

Poisoning by these substances is so very rare that they do not claim any consideration.

**Symptoms.**—Burning sensation in the mouth, throat and gullet, smarting pain in the stomach; blood is vomited as well as evacuated. The person dies of exhaustion.

**Post-mortem Appearances.**—Softened, corroded and inflamed condition of the whole alimentary tract.

**Treatment.**—Lime juice and water; acidulated water; vinegar and water; stimulants, if the person is in a very weak and exhausted condition. The stomach-pump should not be used.

## ANTIMONY.

The two salts of antimony which are used as poisons are the chloride and the tartarated antimony. The latter is commonly used for fattening horses and for producing vomiting in man. In all cases of suspected poisoning, therefore, tartar emetic (tartarated antimony) should not be used as an emetic, as it will create a difficulty in the chemical analysis.

Tartar emetic occurs as a white powder, sometimes, however, tinged yellow. It is insoluble in alcohol, but soluble in 15 parts of cold water and in 3 parts of boiling water. One ounce of the antimonial wine (British Pharmacopœia) contains 2 grains of tartar emetic. The salt may contain minute portions of arsenic, as an impurity.

**Symptoms.**—In acute poisoning by antimony, there is the characteristic metallic taste in the mouth, which is soon followed by smarting heat and burning pain in the stomach, and vomiting and purging. The person complains of intense thirst, difficulty in swallowing, and a sense of constriction in the throat. Giddiness and tetanic spasms close the scene.

The symptoms of chronic poisoning by antimony are very much like those of inflammation of the stomach or bowels. The symptoms are less intense and less rapid than in acute poisoning. The person is greatly depressed in spirits, and complains of constant nausea and retching. He objects to taking food, as it increases the tendency to vomit. The vomited matters consist at first solely of mucus, but soon become mixed with bile.

In some cases, the skin is covered by a pustular eruption which resembles that of small-pox. Even in the most desperate cases of antimonial poisoning, there are always greater chances of recovery than in cases of poisoning by arsenic. The symptoms come on almost immediately after the poison is taken, and death usually occurs in from 10 to 20 hours.

Emaciation gradually sets in, and the person dies exhausted. In all suspected cases, the urine must be examined.

Salts of antimony give an orange precipitate with sulphuretted hydrogen, and can be detected by Marsh's and Reinsch's tests.

Poisoning by salts of antimony are not of common occurrence.

**Post-mortem Appearances.**—An inflamed and softened condition of the throat, œsophagus and stomach. Red patches are also found on the lining membrane of the stomach.

**Fatal dose.**—2 grains of tartarated antimony.

**Treatment.**—The stomach-pump may be used. Decoction of cinchona bark or infusions of tea, gall-nut, or other substances containing tannin act as antidotes. Large quantities of warm mucilaginous drinks (thin rice gruel) may be given with advantage.

## ARSENIC.

Arsenic occurs as the pure metal, arsenious acid (white arsenic), red sulphide (realgar), yellow sulphide (orpiment), and as the arsenites of potash and copper.

Metallic arsenic has a steel-grey color, is brittle in consistence and sublimes, without previous fusion, at a temperature of about 400° F. The vapour of the metal has a characteristic garlic-like odour.

**Arsenious acid** (white arsenic) is the most important of all the arsenical compounds. When freshly prepared by sublimation, it exists in the form of semi-transparent white masses, which by exposure to air and light gradually become opaque. As found in commerce, it occurs under two forms,—either as a solid cake, or as a white powder which is not unlike wheat flour in appearance. It has no odour, and is almost devoid of taste, and may, therefore, be easily mixed in large quantities with the common articles of diet. It is very sparingly soluble in cold water, about a grain being dissolvable in an ounce of water.

Arsenic is much used in medicine (native and western) and in the arts—in coloring wall papers, in calico-printing, &c. In medi-

cine, arsenic is administered internally in the treatment of certain skin diseases, ague, general debility, &c., and externally to destroy cancerous and such like tumours. The preparations commonly used for administration are Fowler's solution, Donovan's solution, and the hydrochloric solution.

White arsenic is used in farming for destroying vermin, spores of fungi in corn, &c. Arsenic is the most important of all the metallic poisons, and has been used to destroy man and cattle alike. It is used frequently as an aphrodisiac, and those who are habituated to take it have been known to consume as much as 5 grains for a dose. It acts as a poison either when taken internally, or when applied externally in the form of paste.

**Symptoms.**—In acute poisoning, the symptoms usually commence in about half an hour after the poison is swallowed. But the virulence and rapidity of the symptoms are more or less modified by the form and quantity. In one recorded case in which the poison was taken in solution, the symptoms commenced immediately after it was swallowed.

The patient feels faint, vomits incessantly, complains of burning pain in the pit of the stomach, and has loose motions: a feeling of constriction of the throat, difficulty of breathing, restlessness, cramps in the legs and general weakness, with a cold and clammy skin are also prominent features. The pain in the pit of the stomach is accelerated by the slightest pressure. Nausea and vomiting are also present, and the vomiting is increased by swallowing any substance either solid or liquid. The person usually suffers from intense thirst.

Large doses of the poison usually destroy life in from 18 to 72 hours. But the average time at which death takes place is 24 hours, though the poison may destroy life within a much shorter period.

Thus it will be observed that the symptoms closely resemble those of cholera; and great discretion is requisite to recognize a case of arsenical poisoning in a place where the cholera epidemic is prevalent.

Certain anomalies in the symptoms may occur. The thirst and pain in the stomach may be absent or very slight. Vomiting and purging do not occur in all cases. The symptoms may resemble those of narcotic poisoning.

The poison is rapidly eliminated by the kidneys, and no trace of the poison may be found in the system if the person lives for 16



days after the administration. In all suspected cases, therefore, the urine should be at once examined for the poison.

Arsenic can be detected by its emitting the odour of garlic when heated, by its giving a yellow precipitate with sulphuretted hydrogen, and by Marsh's and Reisch's tests.

In **Chronic poisoning**, the symptoms are not so well marked as in acute poisoning, and are frequently so misleading that death resulting from such a cause has been attributed to 'spontaneous inflammation of the bowels.' The more pronounced symptoms are an inflamed and watery condition of the eyes, the appearance of vesicles, pustules, &c., along with an irritable condition, on the skin, the falling off of hairs, emaciation and exhaustion.

**Post-mortem Appearances.**—In poisoning by arsenic, it takes a longer time for the body to putrefy. The mucous membrane of the stomach is deeply tinged (being crimson in color), and the stomach, the small intestines as well as the colon are acutely inflamed.

**Fatal Dose.**—2 grains of white arsenic.

**Treatment.**—The best antidote for the poison is the freshly prepared hydrated peroxide of iron, which is prepared by adding excess of ammonia to the tincture of the perchloride of iron. The stomach-pump or emetics, preferably zinc sulphate, may be used, and then milk and eggs or lime-water and oil may be given.

The antidote administered by natives is a mixture of human faeces or cowdung and red cotton-flower juice. It is said that recoveries have followed even when large quantities of white arsenic had been swallowed.

## COPPER...

The important salts of copper are the sulphate (bluestone), the acetate (verdigris), and the arsenite. Poisoning by these substances is rare, and when it occurs it is generally accidental.

In this country it occurs as the result of cooking vessels not being well tinned. The use of German silver—an alloy of copper zinc, and nickel—may be rendered dangerous by the action of acid food on the compound.

Medicinally, the sulphate and the acetate of copper are used as emetics, in cases of poisoning, &c.

**Symptoms.**—Pain in the epigastrium, vomiting and purging, bluish discoloration of the gums; headache and difficulty of

**breathing.** The vomited matter is bluish or greenish in color. Jaundice may come on, if the person recovers.

**Post-mortem Appearances.**—Inflamed and greenish condition of the stomach and intestines.

**Treatment.**—Emetics; milk and eggs. Vomiting may be easily induced by the free use of warm water.

## LEAD.

The principal poisonous salts of lead are the acetate (sugar of lead), the subacetate, and the carbonate (white lead, used for painting).

The acetate of lead resembles loaf sugar in its general appearance. It is sweet to the taste and is freely soluble in water and alcohol.

Evil effects may be produced by the mixture of lead with tin in the manufacture of tin vessels which are so commonly used in Hindu household. Care should, therefore, be taken to have the vessels made of pure tin.

**Symptoms.**—In acute poisoning, there is the characteristic metallic taste in the mouth, accompanied with a dry condition of the throat and intense thirst, very soon after swallowing the poison. Colicky pains are felt in the abdomen which are twisting in their nature and sometimes relieved by pressure. The bowels are constipated, and the stools when passed are dark-colored. Vomiting may be present, but it is not a constant symptom. Sometimes, the person suffers from cramps in the legs. The body temperature is lowered, his pulse is weak, and he feels his strength considerably diminished. He feels dull and giddy, and may pass into a comatose or convulsive condition, which is shortly followed by death.

In chronic poisoning, which occurs in those who work in lead as plumbers, painters, type-founders, &c., the patient at first feels unwell and complains of general weakness. He soon begins to suffer from severe colicky pains and obstinate constipation. His tongue becomes dirty, his breath foetid, the inside of the mouth dry and parched, and his appetite impaired. There is usually the disagreeable metallic taste in the mouth. The two other symptoms of importance which have yet to be noted are the 'dropped hand' due to paralysis of the extensor muscles of the wrist, and the well-marked blue line on the gums.

**Post-mortem Appearances.**—Salts of lead may be deposited on the mucous membrane of the stomach, which is in an inflamed condition. If the dose be large, the mucous membrane of the stomach may be found corroded.

**Treatment.**—Emetics; sulphate of magnesium or sodium. The carbonates of sodium or magnesium should not be given, as the carbonate of lead is poisonous. Milk and eggs. In chronic poisoning, the iodide of potassium has proved very useful. Galvanic baths have lately been tried with considerable success.

## MERCURY.

Mercury, like arsenic, is very freely administered by the native *vydians*. Metallic mercury is not poisonous. Poisoning may result either when a salt is administered internally, or when an ointment, &c., containing mercury is rubbed into the skin in large quantities, or when the vapour of the metal is inhaled.

The chief poisonous salts of mercury commonly used are the perchloride (corrosive sublimate) and the subchloride (calomel).

**Corrosive** sublimate is the most important of the preparations of mercury. It occurs either in crystals or as a white powder. It is known also as the bichloride, chloride or the oxymuriate of mercury. It is soluble in sixteen parts of cold and in three parts of boiling water. When applied externally to the unbroken skin, it has caused death in many cases, the symptoms being the same as those which come on when the substance is administered by the mouth. It is very freely used in medicine, both as a lotion for cleansing wounds, &c., and as the liquor hydrargiri perchloridi of the British Pharmacopœia in certain diseases, such as syphilis. One ounce of the pharmacopœial solution contains half a grain of corrosive sublimate.

As the poisonous effects of calomel are supposed to be either due to an adulteration with corrosive sublimate or to the calomel being converted into corrosive sublimate by the acid in the stomach, it needs no separate consideration.

**Symptoms.**—In acute poisoning, the symptoms appear as soon as the poison is swallowed. Along with the metallic taste in the mouth, there is a choking and burning sensation in the throat. The burning sensation extends from the throat to the stomach and is sometimes very painful. Violent purging soon supervenes, the stools being mixed with mucus and blood, accompanied with nausea and vomiting, the vomited matters consisting of sticky mucus, which is also tinged with blood. The face becomes either flushed or pale, and the tongue in some cases becomes white and shrivelled. The skin is cold and clammy, and the urine is very scanty or com-

pletely suppressed. The pulse is irregular, weak and feeble. Salivation occurs in cases where the fatal termination is prolonged. Though the symptoms appear immediately after swallowing the poison, the poison is not rapidly eliminated from the system.

The symptoms of **chronic poisoning** by corrosive sublimate are as follow:—Nausea; occasional vomiting; pains in the stomach; constitutional disturbance and a depressed state of the mind; salivation; swelling and pain in the glands of the mouth; a swollen spongy or ulcerated condition of the gums, with dropping of the teeth in severe cases; a peculiar, offensive condition of the breath; an irritable and relaxed condition of the bowels; neuralgic pains and mercurial tremors.

**Post-mortem Appearances.**—Softened and ulcerated condition of the stomach and intestines, and an inflamed condition of the kidneys and bladder.

**Fatal dose.**—Three grains of corrosive sublimate have caused death in a child. But the quantity requisite to kill an adult has not been accurately ascertained.

**Treatment.**—Emetics; milk and mucilaginous drinks. The stomach-pump should not be used. The best antidote is animal or vegetable gluten—eggs or wheat flour.

## PHOSPHORUS.

There are two kinds of phosphorous—the non-poisonous, amorphous variety (used in safety-match boxes) and the ordinary poisonous variety (used in lucifer matches). With the latter alone we are concerned.

**Symptoms.**—When the symptoms first appear, they resemble those of irritant poisons in general. After some days, however, the characteristic symptoms begin to show themselves. The person becomes very weak; passes loose bloody motions; the belly becomes swollen, and he vomits matter which smells like garlic and which is phosphorescent in the dark. The phosphorescent condition may also be observed in the stools passed. The pulse is very weak, the surface of the body is bathed in cold perspiration, and he has an anxious countenance.

In males, priapism is of common occurrence. The urine becomes suppressed. Spots resembling those of purpura sometimes appear on the skin, due to the deranged condition of the blood. The liver is thrown out of order, and he gets jaundiced. The symptoms gradually get worse, emaciation sets in, and he is attacked with convulsive fits and dies comatose.





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**Post-mortem Appearances.**—The skin is jaundiced; the stomach is softened, and its contents are luminous in the dark; the urine is bloody, and there is fatty degeneration of the kidneys, heart and liver.

**Fatal dose.**— $1\frac{1}{2}$  grains.

**Treatment.**—Stomach-pump or emetics; sulphate of copper is an exceedingly valuable antidote in cases of poisoning by phosphorus; mucilaginous drinks. Oil should not be given in these cases, as phosphorus dissolves in the oil, and thus absorption of the poison is promoted.

## VULNERANT POISONS.

**Glass, Needles, &c.**—Needles and even small knife-blades have been swallowed with suicidal intention, and recoveries have taken place. Ground glass is administered with food in some cases to kill persons. These act by irritating the stomach and intestines.

**Treatment** depends on the size of the substances swallowed. If small, solid food should be given, and the stools should be carefully examined. If the substances have not come out, or if they are large and likely to cause death, a surgical operation may be necessary. Purgatives should not be given.

There is a common belief in this country that powdered diamond is a very efficacious poison. This belief has no foundation in fact.

## CHAPTER III.

## VEGETABLE POISONS.

### ACIDS (ORGANIC).

**Hydrocyanic Acid** or Prussic acid.—This is one of the most rapidly fatal of poisons, death taking place in two minutes when a large dose is taken.

**Symptoms** come on immediately after swallowing the poison, and closely resemble those of an attack of epilepsy. The person becomes first giddy, then insensible; his skin becomes covered with clammy sweat; his pupils are dilated; his jaws are closed; his breathing becomes stertorous and convulsive, and he dies suffocated.

**Post-mortem Appearances.**—The body smells of the acid ; the hands are clenched ; there is froth about the mouth and nostrils, the eyes are prominent and shining, and the skin is pale or cyanosed.

**Fatal dose.**—45 minims of the dilute acid of the British Pharmacopœia.

**Treatment.**—Emetics, stimulants (ammonia) and cold affusions are most useful. Chlorine seems to be the best antidote. But in most of these cases, the patient dies before medical aid could be given.

**Oxalic Acid.**—Oxalic acid may be mistaken for magnesium sulphate, or for the sulphate of zinc.

When taken in large doses, the **symptoms** are those of irritant poisoning in general—acid taste, pain and constriction in the throat, with swelling of the tongue and difficulty of breathing ; burning sensation in the pit of the stomach ; purging and vomiting of mucoid or bloody matter ; the patient dies collapsed. In small doses, the symptoms resemble those of opium, and the patient dies comatose.

**Post-mortem Appearances.**—An exceedingly soft and white condition of the mouth, throat and œsophagus ; the stomach may participate of this condition or may be healthy, and contains dark coffee-ground matter.

**Fatal dose.**—3 drams.

**Treatment.**—Emetics ; warm water ; chalk. The stomach-pump should not be used. Alkalies should not be given, as they form soluble poisonous salts with oxalic acid.

**Carbolic Acid.**—This substance has been mistaken for epsom salts and swallowed in consequence.

**Symptoms.**—Acid taste in the mouth and smarting sensation along the œsophagus and in the stomach ; the abdomen gets distended ; there are muscular twitchings ; the skin is pale and cold ; the urine is colored dark-green ; and the patient dies comatose.

**Treatment.**—Stomach-pump or emetics ; lime-water and oil.

## ACONITE.

The root of this plant contains an alkaloid named aconitine, which is one of the most, if not the most, virulent poison in existence. It has been used in this country for purposes of poisoning from very early times.

**Aconite** is largely used in medicine in fevers, neuralgia &c.

**Symptoms.**—When taken internally, there is an acrid sensation on the tongue, followed by numbness and tingling. Nausea and vomiting soon follow. The patient becomes giddy and loses power over his limbs. The pupils become dilated. Urine is passed in large quantities, his pulse becomes small, the temperature falls steadily, and he generally dies all of a sudden.

**Post-mortem Appearances.**—There is engorgement of the brain and its membranes, together with general congestion of the venous system.

**Treatment.**—Emetics ; castor oil ; stimulants. Digitalis is the best antidote.

**Conium and Calabar bean** may be classed with aconite, as they closely resemble it in their general symptoms, producing giddiness, loss of muscular power and irregular action of the heart. In conium, the pupils are dilated as in aconite, whereas in calabar bean the pupils are contracted. The *post-mortem* appearances and the treatment are like those of aconite.

### CAMPHOR.

Poisoning by this substance is rare and mostly accidental. But several cases have lately occurred from the use of the homœopathic solution of the substance which is about seven times as strong as that of the British pharmacopœia.

**Symptoms.**—Irritation and pain in the stomach ; vomiting of blood-tinged matter ; dulness ; giddiness ; convulsions ; foaming at the mouth. The skin is hot, the face flushed and the pupils dilated.

**Post-mortem Appearances.**—The body smells of camphor. The brain is congested. The stomach and intestines are inflamed.

**Treatment.**—Stomach pump or emetics ; purgatives ; stimulants.

### DEATURA (Stramonium).

This plant is commonly seen growing on refuse heaps in this Presidency. It is well-known to all classes of people as a poisonous shrub, and has been used from the earliest times for the purpose of poisoning. All parts of the plant are poisonous.

**Symptoms.**—The person soon becomes giddy and delirious ; the eyes assume a frightful look ; and the pupils are dilated ; the face becomes flushed. These symptoms together with a rise of temperature were observed by Dr. Smyth of the Madras General

Hospital in the case of two European lads who ate the dhatura fruits on the 24th April 1890. Amongst other symptoms mentioned by Lyon are "muttering, ludicrous movements, grasping at imaginary objects, trying to pull threads out of the finger tips, &c."

**Post-mortem Appearances.**—Slight irritation of the alimentary canal, dilatation of the pupils, and congestion of the vessels of the brain.

**Fatal dose.**—2 grains of daturine (the alkaloid of the plant).

**Treatment.**—Stomach-pump or emetics; purgatives; stimulants. Morphia may be given as an antidote.

**Belladonna and Hyosyamus** belong to this class, and resemble dhatura in their symptoms and *post-mortem* appearance, and require the same treatment.

### DIGITALIS.

All parts of this plant are poisonous and contain the alkaloid digitaline.

**Symptoms.**—Pains in the abdomen, nausea, vomiting and purging; the pupils become dilated and insensible to light, and the patient loses his power of vision; he suffers from headache and giddiness; the pulse becomes irregular and weak, and he dies of syncope.

**Post-mortem Appearances.**—Inflammation of the mucous membrane of the stomach, and a congested condition of the brain and its membranes.

**Treatment.**—Stomach-pump or emetics; purgatives; stimulants; infusion of cinchona, tea, gall-nut or other substance containing tannin.

### INDIAN HEMP (Gunjah).

Gunjah is largely used in many parts of this country as an intoxicating drug.

**Symptoms.**—At first it produces an "exaltation of the feelings, with pleasing grandiose ideas and hallucinations. Noisy, restless delirium supervenes, with muscular excitement, or more commonly sleep," from which he may not awake if he has swallowed a large quantity of the substance.

**Treatment.**—Stomach-pump or emetics; stimulants and cold affusions.

## NUX-VOMICA.

**Nux-vomica** seeds are well known in this country, and are habitually used by some people with a view to increase their strength, or to become proof against cobra bites ! **Nux-vomica** is a deadly poison, and contains two alkaloids, strychnia and brucia. The drug is intensely bitter.

**Symptoms.**—The symptoms of nux-vomica poisoning may be said to be those of tetanus, without the lock-jaw, the suffocating sensation, the muscular twitchings, the convulsions, the congested face and staring eyes being all present. During the convulsions, the body sometimes assumes a bow-like form, being arched in the back and resting on the head and heels ; the abdomen becomes tense ; the chest fixed ; and the feet inverted or everted. As death approaches, the fits become more frequent, and the person dies either suffocated or exhausted.

**Post-mortem Appearances.**—*Rigor mortis* continues for a long time ; the hands are clenched ; the feet arched ; the blood fluid ; the heart empty ; the lungs, the brain and spinal cord are all congested.

**Fatal dose.**— $\frac{1}{4}$  grain of strychnine.

**Treatment.**—Stomach-pump or emetics ; opium ; chloroform ; conium or chloral hydrate. If none of these is available, tobacco may be given.

## OPIUM.

This substance, which has been called ‘ the gift of God to man,’ was first introduced into this country by the Mahomedans. Ever since that time, it has been used as an intoxicant.

“ The habitual opium-eater may be known by his attenuated body, withered yellow countenance, stooping posture, and glassy, sunken eyes.” Children are more susceptible to this poison than adults.

The important constituents of opium are morphine, meconic acid, narcotine and codeine. Opium is extensively used in European as well as in native medicine. One grain of opium is contained in 14 $\frac{1}{2}$  minims of the tincture of opium of the British Pharmacopœia.

**Symptoms.**—“ Exaltation of the feelings, a sense of happiness and comfort, brilliancy of imagination, and increase of intellectual power and mental vigour generally, all accompanied by brightness of expression and manner.”

The person then becomes giddy, drowsy and unconscious.

He may be roused by loud noise, but immediately relapses to his drowsy condition. The pupils are very contracted and insensible to light. Sickness and vomiting may be sometimes present. The bowels are confined. The face is livid, and the skin becomes cold and clammy. The breathing becomes shallow and stertorous, the pulse weak and irregular, and he dies comatose.

**Post-mortem Appearances.**—The skin is livid. The digestive tract looks healthy. The lungs are congested. The vessels of the brain are engorged, and there may be effusion or even extravasation of blood in the ventricles, at the base of the brain and around the spinal cord.

**Fatal dose.**—4 grains.

**Treatment.**—Stomach-pump or emetics; stimulants. The patient must be walked about.

## OLEANDER AND PLUMBAGO.

These are irritant poisons. But nothing more is known definitely about them. As in the case of arsenic, human fæces is administered as an antidote for poisoning by oleander in this country.

## CHAPTER IV.

### ANIMAL POISONS.

**Putrid Animal Matters.**—Poisoning may take place as the result of eating putrid animal food, especially in the form of sausages, bacon, cheese, &c., or by certain alkaloids, the result of animal decomposition, or by certain poisonous fish. The symptoms are those of irritant poisoning.

**Treatment.**—Emetics; purgatives.

### CANTHARIDES (The Spanish-fly).

Poisoning by this substance is rare in this country. This poison is used in European and Indian Medicine.

**Symptoms.**—Acrid sensation in the mouth; a feeling of constriction of the throat; difficulty in swallowing; burning pain in the stomach. The urine, the stools and vomited matter are all bloody. Erection of the penis is common. Convulsions and delirium supervene and are quickly followed by death.

**Post-mortem Appearances.**—The inside of the mouth is swollen ; the tonsils are ulcerated ; the œsophagus, the stomach and the intestines are all acutely inflamed. Portions of the wings of the insect may be discernible by the microscope in the contents of the stomach.

**Fatal dose.**—One ounce of the tincture of cantharides.

**Treatment.**—Emetics, warm water freely, castor oil ; opium to relieve pain.

### SNAKE BITES.

The cobra (*Naga tripudians*) is the most common and the most deadly of snakes in this country. Deaths from cobra bites are purely accidental.

**Symptoms.**—The feeling which a person experiences when a cobra bites has been compared to the penetrating of the flesh by a style let down from a height. There is great prostration ; he is unable to speak, swallow or support himself. The pupils are dilated, the face livid, the heart's action feeble ; he becomes unconscious and expires. The symptoms come on soon, and death takes place within a few hours.

**Post-mortem Appearances.**—The blood is very dark and fluid. Even in cases of recovery, the blood is said to lose the tendency to coagulate.

**Treatment.**—Recovery is rare, unless the amount of poison injected into the blood is small and insufficient to destroy the life of the person.

In all cases, the treatment should be prompt and energetic. A tight ligature must be applied round the limb on that side of the wound which is nearest the heart. The wounded part should be cut out or cauterized. The hypodermic injection of a one per cent. filtered solution of potassium permanganate is said to counteract the poison very effectively. Ammonia in the form of liquor may be given internally, or injected into one of the veins of the wounded part. Fowler's solution is said to have been useful in some cases.

## CHAPTER V.

**CHEMICO-LEGAL EXAMINATIONS.***(From G.O., 30th May 1883, No. 1062.)*

The following instructions are divided into two sections, viz. :—

*Section I.*—Containing rules for the guidance of magisterial and police officers.

*Section II.*—Containing rules for the guidance of medical officers. Neither section is complete by itself, the two sections being complementary to one another.

**SECTION I.**

The following instructions are issued for the guidance of Magistrates, Superintendents and Assistant Superintendents of Police with regard to transmission of substances to the Chemical Examiner for examination, in cases of suspected poisoning, or other cases in which the aid of the Chemical Examiner may be required.

2. In future, substances will not be forwarded by medical officers to the Chemical Examiner, except upon receipt of an order to that effect from a Magistrate, Superintendent or Assistant Superintendent of Police. It will, therefore, be necessary that orders for the transmission of substances to the Chemical Examiner for analysis should be issued with promptitude. And an order should invariably be granted, if the medical officer considers it advisable to obtain the opinion of the Chemical Examiner; whilst on the other hand, Magistrates, Superintendents and Assistant Superintendents of Police should issue an order for examination, if they consider it desirable to consult the Chemical Examiner, although the opinion of the medical officer be adverse to such a proceeding.

3. Magistrates, Superintendents and Assistant Superintendents of Police, on instructing medical officers to forward articles for analysis to the Chemical Examiner to Government, should, at the same time, address the latter officer, quoting the number and date of their order to the medical officer with a brief summary of the history of the case.

4. The principal points on which Magistrates, Superintendents and Assistant Superintendents of Police, in cases of sus-



pected poisoning, should furnish information to the Chemical Examiner, are as follows:—

(a) What interval was there between the last eating or drinking, and the first appearance of symptoms of poisoning.

(b) What interval was there between the last eating and drinking and death (if this occurred).

(c) What were the first symptoms.

(d) Were any of the following symptoms present? If so, state which:—

(a) Vomiting and purging.

(b) Deep sleep.

(c) Tingling of the skin and throat.

(d) Convulsions or twitchings of the muscles.

(e) Delirium and clutching at imaginary objects.

Were any other symptoms noticed.

(f) Did any other persons partake of the suspected food or drink, and did they also suffer from similar or other symptoms of poisoning?

5. Any other information available, likely to prove serviceable as a guide to the class of poison administered, should at the same time be furnished.

6. Certificates of chemical analysis are not to be accepted from medical officers, as these officers are not in a position to conduct analyses as they should be carried out for judicial purposes. But any medical officer, who may be provided with a suitable microscope, should be able to recognise recent blood stains, and to conduct examinations of suspected seminal stains.

7. In every case of suspected human or cattle poisoning, it is desirable that all the substances requiring analysis should be packed and forwarded to the Chemical Examiner by the nearest medical officer. If special circumstances should render it desirable to forward any articles directly to the Chemical Examiner, the instructions given in section II, paras. 4—12, must be carefully attended to.

8. *Suspected Blood Stains*.—Articles requiring examination for the purpose of blood stains may, if desirable (*vide* para. 6),

be forwarded direct to the Chemical Examiner, the following rules being strictly attended to:—

(1) When clothes are sent up, any stains considered to be suspicious should be indicated by means of pencil marks or pins. Stains on walls, floors, the ground, or articles of furniture, &c., are not to be scraped off. But the stained area is to be carefully cut out; and when the material is brittle, as in the case of earth or chunam, it should be carefully wrapped in cotton wool and packed in a box, so that the surface may be preserved from injury.

(2) All articles requiring examination should be carefully labelled, and each label should bear the signature of the forwarding officer, and the number and date of the letter of advice addressed to the Chemical Examiner. All parcels should be carefully sealed by the despatching officer, and packed in such a manner that they cannot be opened without destroying the seal. The seal used should be the same throughout, and a private seal, or an official seal, which is kept in safe custody. A letter of advice should be separately forwarded to the Chemical Examiner. This letter should contain—

(a) An impression of the seal used in closing the packets and description thereof.

(b) A list of the articles forwarded, and a statement as to how the articles have been forwarded.

(c) Information as to whether any of the weapons, clothes, &c., are to be returned after examination.

9. *Miscellaneous Examinations.*—Magistrates, on forwarding coins, documents, salines, liquors, &c., to the Chemical Examiner, should follow the instructions laid down in para. 8, clause 2, and in section II, para. 11, so far as they may be applicable; and should be careful to include in their letter of advice to the Chemical Examiner, information as to the nature and object of the examination required, and to furnish any other information likely to assist the Chemical Examiner in making the required examination.

10. *Analysis of Water.*—*Vide* Section II, para. 15.

## SECTION II.

**Instructions for the guidance of medical officers.**—Medical officers in charge of hospitals and dispensaries are required to maintain a supply of methylated spirit and suitable bottles, &c., in readiness for the transmission of viscera and other matters to

the Chemical Examiner, when occasion may arise. In cases of suspected poisoning, it is exceedingly important that viscera and other suspected matters, liable to rapid decomposition, should be placed in spirit as soon as practicable. And every care should be taken lest doubt may be raised in court as to the identity of articles likely to require examination, or as to the possibility of their having been accidentally contaminated or improperly interfered with.

2. *Post-mortem* examinations are to be made as thoroughly as circumstances will permit, whenever desired by magisterial or police officers. Attendance upon midwifery cases, or other similar excuses, will not exempt medical officers from the performance of the too frequently unpleasant, though most important, duty of making a *post-mortem* examination. Advanced decomposition does not prevent the detection of metallic poisons in the body. Hence remains of viscera may be forwarded for examination, when the condition of the body is such as to render any attempt at dissection useless.

3. On making a *post-mortem* examination, whenever there is any suspicion of poisoning, the stomach should be tied at both ends (a double ligature being applied at the pyloric extremity, so that the contents of the intestines may not escape), and removed from the body in such a manner that its contents may be retained; after removal it should be opened, the contents received into a perfectly clean bottle, and the mucous surface of the stomach carefully examined, its appearance noted, and any suspicious particles found adherent thereto should be picked off with a pair of forceps, and placed in a separate small phial for transmission. And the mucous membrane of the mouth, pharynx and œsophagus should be examined, and any unusual appearance or marks of corrosion therein carefully noted.

4. In all cases of death from presumed poisoning, the following articles should be forwarded for analysis, each in a separate bottle, unless otherwise indicated. It will, however, be understood that other matters should be forwarded if, in the opinion of the medical officer, the special circumstances of any case render such a proceeding advisable :—

(a) Stomach.

(b) Contents of the stomach which may, if it be convenient, be put in the same bottle with the stomach.

(c) Suspicious particles (if any have been found) removed from the mucous membrane of the stomach.

(d) A portion of the liver not less than 16 oz. in weight, or the whole liver, if it weigh less than 16 oz., and one kidney.

(e) The vomited matter, if any. The earlier and the later vomits should, when practicable, be sent up in different bottles; and the labels should state at what period the matters were emitted. Special directions are given in para. 6 for the disposal of vomited matters mixed with earth, &c.

(f) A specimen of the spirit used. Four ounces are sufficient.

*When it is suspected that a vegetable poison has been used, the following matters should also be forwarded:—*

(g) The contents of the small intestines.

(h) Any urine which may have been separately collected after the commencement of symptoms, or found in the bladder after death.

5. Strong methylated spirit should in all cases be added, as laid down in the rules for the transmission of articles for analysis, detailed in para. 11, to the contents of bottles A, D, G, H, and also to the bottles B and E, unless it be suspected that alcoholic poisoning has been the cause of death. No spirit need be added to the contents of bottle C. Care should be taken that no vessel containing fluid matters is quite filled.

6. Vomited and purged matters are frequently received by medical officers mixed with earth, &c. If the admixture of earth be sufficient to render the evacuated matters dry and inoffensive, they may be packed without spirit in any convenient manner; otherwise they must be packed with spirit. Vomited and purged matters, if they have, as frequently happens, been allowed to fall on the ground, should be carefully scraped up, not taking more earth than is necessary. The superficial scrapings should be packed separately. It is rarely necessary to remove the earth to a depth greater than half an inch, even in cases of suspected metallic poisoning, unless the soil be of a very loose character. Except when a metallic poison is suspected, it is very rarely necessary to forward purged matters.

7. If articles of food, medicine, &c., suspected to have been the vehicle by which poison has been administered, require examination, they should each be packed up separately and spirit invariably added, as in the case of viscera, to such as are liable to decomposition. Fruits, such as the plantain and custard-apple, if suspected to contain poison, should be carefully inspected, and if it should appear that some foreign substance has been inserted,

this should be picked out and sent up for examination. If no suspicious substance can be discovered, the fruit should be forwarded.

8. After having made a *post-mortem* examination in a case of suspected poisoning, and having preserved in spirit all articles liable to rapid decomposition, which are likely to require examination, the medical officer should report the result of his examination to the police, and on receipt of an order from a Magistrate, or from a Superintendent or Assistant Superintendent of Police, but not before, forward the viscera of the deceased, and such other articles as may require chemical analysis, to the Chemical Examiner to Government for examination. In cases where no death has occurred, but where it is suspected that poison has been administered, the medical officer, having preserved in spirit all articles liable to rapid decomposition, which are likely to require examination, should similarly report the case to the police, and on receipt of an order from a Magistrate, Superintendent or Assistant Superintendent of Police, forward the vomited matter or contents of the stomach removed by the stomach-pump, of the affected individual, or other matters requiring analysis, to the Chemical Examiner to Government. Though Magistrates, Superintendents and Assistant Superintendents of Police are required to grant an order for analysis, should the medical officer consider such an examination necessary, they can, if they consider it advisable, order viscera, &c., to be sent to the Chemical Examiner, when, in the opinion of the medical officer, such a proceeding may be quite unnecessary.

9. When, on receipt of the necessary order, a medical officer forwards articles to the Chemical Examiner for examination, he should address at the same time a letter to the Chemical Examiner, advising him of their despatch. This letter should contain :—

(a) An impression of the seal used in closing the bottles, and a description thereof.

(b) A list of the articles forwarded, and a statement as to how the articles have been forwarded.

(c) The name of the officer from whom the order has been received to forward the articles, and the number and date of such order.

(d) A detailed account of the *post-mortem* appearances observed.

(c) If he has seen the case during life, an account of the symptoms observed, and a statement of the treatment, if any, adopted.

10. All bottles and packets should be carefully sealed by the medical officer, and closed in such a manner that they cannot be opened without destroying the seal. The seal used should be the same throughout, and a private seal, or an official seal, which is always in safe keeping. Each bottle or packet should be labelled, and each label should bear the number and date of the letter of advice to the Chemical Examiner relative to the case, as well as a short description of the contents, and should be signed by the medical officer.

11. **Rules for the transmission of substances for Analysis.**—Suspected substances may be forwarded by post, carriage bearing, by passenger train, or steamer, or in charge of a constable. The latter method is recommended in all cases in which wealthy or influential parties are implicated. Officers forwarding viscera, &c., by post, by rail, or by steamer, or by constable to the Chemical Examiner, will be held personally responsible that the following instructions are carefully followed:—

**Transmission by Post.**—When viscera, &c., are forwarded through the post, the following rules are to be observed:—

(1) The suspected viscus, or other portion of the body or other substance liable to decomposition requiring to be sent for examination, should be enclosed in a glass bottle or well glazed earthenware jar, provided with a well-fitting stopper or sound cork.

(2) If liable to decomposition, it should be immersed in methylated spirits of wine, which should be used in the proportion of one-third of the bulk of the material, and care should be taken that no vessel containing liquid matters is quite filled.

*N.B.*—The use of spirits of wine in packing viscera should be invariable, whether the season is hot or cold, and care should be taken that common bazaar spirit is not used.

(3) The stopper or cork should be carefully tied down with bladder, and large corks should, be coated over externally with wax, glue or tar. To ascertain that it has been securely closed, the bottle or jar should be placed for five minutes with its mouth down.

(4) The glass bottle or jar should then be placed in a strong wooden, or extra strong tin box, which should be large

enough to allow of a layer of raw cotton, at least one inch thick, being put between the bottle or jar and the box.

(5) The box itself should be encased in common garah cloth, which should be sealed in accordance with the usual rules of the post office as to parcels.

(6) When articles are forwarded by post to the Chemical Examiner to Government, each package should be franked externally with the name and address of the officer forwarding the articles, and a declaration of contents to the officials of the postal department is unnecessary, and should not be made.

(7) At all stations where there is a District Civil Surgeon, the parcels should, when practicable, be sent to the post office by that officer, and not by a subordinate officer, but where there is no Civil Surgeon, substances may be packed and forwarded direct to the Chemical Examiner, by the subordinate officer in charge of the hospital or dispensary.

**Transmission by Rail or Steamer.**—When viscera, &c., are forwarded by rail or steamer, it is unnecessary to encase the box in cloth, but with this exception the rules for forwarding articles through the post must be observed in forwarding articles by passenger train or steamer.

**Transmission by Constable.**—When viscera, &c., are forwarded in charge of a constable, it will not be necessary to pack the bottles, &c., in a strong box, in order to protect them from rough handling during transit. But it is desirable that glass bottles containing viscera, &c., should be wrapped in cloth or paper so as not to be offensive to other passengers.

In every other respect the same rules should be observed as in the transmission of viscera, &c., by rail.

**12. Suspected Blood Stains.**—Medical officers are in many instances expected to deal with these cases themselves—*vide* section I., paras. 6 and 8.

**13. Suspected Seminal Stains.**—*Vide* section I., para. 6. As the clothes requiring examination in these cases are usually exceedingly dirty, it is advisable, when practicable, to cut out any suspicious stains and forward them only for examination, instead of the whole garment. In cutting out stains, about half an inch of the surrounding cloth should be removed also. For information regarding packing and despatch of letter of advice, see instructions under head of Blood Stains—*vide* section I., para. 8.

14. *Cattle Cases* :—

(1) Some precautions should be taken to ensure that viscera, &c., are not sent for examination in cases where death obviously occurred from causes other than poison. A careful search should be made for any indication of the presence of a sui, when this mode of poisoning is suspected, and if anything resembling a sui be found, it should be forwarded for examination. A chemical examination of the viscera is useless in case of sui poisoning, as in such cases poison cannot be detected in the viscera.

(2) The entire alimentary canal should be opened, and its contents inspected for suspicious-looking substances. If any suspicious-looking substance be detected in the alimentary canal, it should be packed in a separate vessel, and spirit should not be added unless necessary for its preservation.

(3) About two pounds of the contents of the stomach, with about a pound of the contents of the intestines, should be placed in a clean glass or well-glazed earthen vessel or vessels, and strong methylated spirit added in the proportion of not less than one-fourth of the apparent bulk of the material, when the contents are nearly dry, but if much liquid be present, spirit should be added in the proportion of one-third of the bulk of the material.

A sample of the spirit used in packing should also be sent. Four ounces are sufficient.

(4) Dried cattle dung may be sent without addition of spirit.

(5) Suspected cattle poisons rarely require the addition of spirit for their preservation, and spirit should not be used unless necessary.

(6) The instructions given as to the packing and transmission to the Chemical Examiner of substances requiring chemical examination, in cases of suspected human poisoning, are applicable to these cases, and should be carefully attended to, and the same precautions must be adopted as to sealing and labelling the different vessels—*vide* paras. 9, 10 and 11. •

(7) When under instructions received from a Magistrate or Superintendent or Assitant Superintendent of Police a medical officer forwards articles to the Chemical Examiner for examination, he should at the same time address and forward separately a letter to the Chemical Examiner advising their despatch. This letter should contain—

(a) An impression of the seal used in closing the vessels, and a description thereof.



(b) A list of the articles forwarded, and information as to how the articles have been forwarded.

(c) The name of the officer from whom the order has been received to forward the articles, and the number and date of such order.

(d) Information as to the number and kind of animals affected, and number of deaths.

(e) Any information obtainable as to *post-mortem* appearances, nature and duration of symptoms, and which may be likely to indicate the probable nature of the poison.

15. **Analysis of Water.**—Before forwarding a sample of water to the Chemical Examiner for analysis, it is necessary to write to the Chemical Examiner, and ascertain when it will be convenient to receive the sample or samples which may require to be examined, it being desirable that samples should be examined shortly after they are received at the laboratory.

(2) The duty of collecting the samples should always be undertaken by a responsible person. The employment of peons or servants for this purpose is strictly prohibited. The bottles should be thoroughly cleansed, and then well washed out twice with water from the same source it is intended to fill them from just before finally filling them.

(3) Glass-stoppered bottles are best, but if those are not procurable, new corks are to be used with the ordinary quart wine bottle of light colored glass. In filling the bottles, a little space should be left between the cork and the water.

(4) Not less than one gallon of each sample of water is to be forwarded.

(5) Each bottle to be labelled with the name of the well, and date of collection.

(6) On forwarding water for analysis, the medical officer should, at the same time, forward separately a letter to the Chemical Examiner. This letter should contain—

(a) An impression and description of the seal used in closing the bottles.

(b) Information as to the number of samples sent, and a statement as to how the articles have been forwarded.

(c) An explanation as to the reason for which the examination is required, and information as to by whom it is desired.

(d) A statement as to the source from which each sample was collected, and by whom and when each sample was collected.

## PART VIII.

### GLOSSARY.

**Abdomen.**—"The lower belly, or that part of the body which lies between the thorax and the bottom of the pelvis." It is the largest cavity in the body, and it contains the following viscera:—The stomach, the small and large intestines; the liver, the gall bladder, the pancreas, the spleen, the kidneys, the suprarenal capsules, the urinary bladder, and (in females) the uterus.

**Aconite.**—*aconitum*.

**Adhesive inflammation.**—To the sum total of changes which take place in an injured part, when the injury has not been so severe as to cause the death of the part, the term inflammation is applied. The symptoms of inflammation are redness, swelling, heat and pain. Adhesive inflammation is said to be present, when a wound heals by 'adhesive lesion,' 'primary adhesion,' or 'first intention.'

A wound is said to heal by this method when the cicatrix is formed by the multiplication of cells in the connective tissue between the edges of the wound.

**Æsophagus; or gullet.**—The muscular tube through which food and drink pass to the stomach. It extends from the pharynx to the stomach.

**Amputation.**—The operation of amputating or cutting off a limb or other part of the body.

**Anæmia.**—The name given to that condition of the body in which the blood in the system is deficient in quantity or presents abnormal qualities, or in which the blood does not adequately fill the arteries. A person in this condition is said to be anæmic or bloodless.

**Anterior Superior Spine of the Ileum.**—*Vide* ileum.

**Antidote.**—A remedy which prevents or counteracts the ill-effects of a poison.

**Anus.**—The opening of the body by which the excrement is expelled ; the orifice of the rectum.

**Aphrodisiac.**—A drug which increases or stimulates the sexual power.

**Apoplexy.**—Originally this word merely implied a sudden deprivation of sense and voluntary motion, without convulsions. To this condition the name of apoplectic fit or seizure is now given. As this was found to be commonly due to bleeding from the blood vessels of the brain, the term has been used to indicate that condition, and it is in this sense the term is generally used. The meaning of the word, however, has been extended to denote bleeding into any organ ; for example, apoplexy of the lungs (pulmonary apoplexy).

**Areola.**—The conical projection at the summit of the breast is called the nipple. The dark circular discoloration surrounding the nipple is known as the areola.

**Arsenic (white).**—வெள்ளைப்பாஷாணம்.

**Artery.**—“ A vessel or tube which conveys the blood from the heart to all parts of the body.” All arteries were originally supposed to contain air ; hence the name.

**Asphyxia.**—Etymologically the word means an absence of pulse. In the common acceptance of the term, it means “ suspended animation, from impediment to respiration.” The more correct term is apnoea.

**Asthenia.**—Want of strength ; weakness ; debility, due to defect of the blood.

**Auscultation.**—Examination with the stethoscope ; a method of detecting diseases of the lungs, heart, blood vessels, &c., by applying the ear to a tube in contact with the diseased part of the body.

**Blister.**—“ A thin bubble or bladder on the skin containing watery matter ” (serum) ; a vesicle. A blister is occasionally produced by the local application of medicines, for the purpose of examining its contents for poison in suspected cases, and usually for the purpose of relieving certain troubles, such as headache, rheumatism, &c.

**Blood-vessels.**—Tubes containing blood ; they are of two kinds, arteries and veins. Arteries, excepting the pulmonary artery, carry the pure blood from the heart to be distributed to all parts of the body. Veins, except in the case of the pulmonary veins,

carry the impure blood from all parts of the body to the heart. From the heart, the impure blood is taken by the pulmonary artery to the lungs, for purposes of purification. After purification, the blood is returned to the heart by the lungs through the pulmonary veins. This is called the circulation of the blood.

**Blue-stone.**—*நீருக்கி.*

**Bronchitis.**—An inflammation of the small ramifications of the windpipe—of the bronchial tubes.

**Cadaveric.**—Pertaining to a dead human body; from *cadaver*, a dead body.

**Callus.**—The reparative material poured out around the broken ends of a bone.

**Calomel.**—*கலமெல்.*

**Cervical.**—Belonging to the neck.

**Cicatrization.**—The process of scar-formation. The process consists in the consolidation of the newly-formed cells in the space between the edges of the wound and in the absorption of the fluid in the newly-formed tissue.

**Clavicle.**—The collar-bone. It has a double curve, like an ancient key; hence the name.

**Coagulation.**—Coagulation of the blood is said to take place when the blood which flows from a person separates into serum and clot. Blood is made up of *liquor sanguinis* and blood corpuscles, the former containing water, salts, albumen and elements of fibrin. When clotting takes place, the corpuscles and the elements of the fibrin unite and form the clot, leaving a watery fluid called the *serum*, which is composed of water, salts and albumin.

**Colic.**—‘A painful affection of the stomach or bowels.’

**Collapse.**—‘Extreme depression of the bodily energies.’

**Colon.**—(*Vide intestines*).

**Coma.**—Suspension of consciousness, depending immediately on some abnormal condition of the brain.

**Congenital.**—‘Pertaining to an individual from his birth.’

**Cornea.**—‘The strong, horny, transparent membrane in the forepart of the eye, through which the rays of light pass.’

**Corpus Luteum.**—(*Vide ovaries*).

**Corrosive Poison.**—A poison which is characterized by its destructive action on parts with which it comes into contact.

**Corrosive Sublimate.**—சுவீரம்.

**Crypsorchides.**—The testicles are primarily placed in the abdominal cavity near the kidneys, and they descend from their position into the scrotum only during the seventh month of gestation. In some rare cases they never descend into the scrotum at all, being retained in the abdominal cavity. These persons in whom the testicles have not descended into the scrotum have been called crypsorchides.

**Cuticle.**—‘The thin external coat of the skin which rises in a blister.’

**Cyanosis.**—A dark blue or livid discoloration of the body of a person, owing to an impure condition of the blood.

**Delirium.**—‘A raving or wandering of the mind connected with fever.’

**Delirium Tremens.**—A disordered state of the mind caused by the abuse of intoxicating liquors.

**Delusion.**—(*Vide* illusion).

**Duodenum.**—(*Vide* intestines).

**Diaphragm.**—‘A muscle separating the chest or thorax from the abdomen or lower belly.’

**Dislocation.**—Dislocation of a joint is said to take place ‘when the articular surface of one bone is displaced from another.’

**Embryo.**—‘The first rudiments of an animal in the womb, before the several members are distinctly formed.’

**Emetics.**—‘Medicines that provoke vomiting.’

**Ensiform cartilage or xiphoid cartilage.**—(*Vide* sternum).

**Epidermis.**—‘The cuticle or scarf-skin of the body.’ It is this that is constantly shed from the surface of the body as scales.

**Epiphysis.**—The articular end of a bone which is first developed as a separate piece, and united afterwards with the shaft of the bone.

**Epispadias.**—(*Vide* urethra).

**Erysipelas.**—‘A disease called St. Anthony’s fire. A peculiar form of inflammation which occurs chiefly in the skin, generally accompanied with pustules of the affected part, and with symptomatic fever.’

**Exhumation.**—‘The disinterring of a corpse.’

**Fæces.**—Excrement; stool.

**Fauces.**—‘The upper part of the throat, from the root of the tongue to the entrance of the gullet.’

**‘First intention.’**—*Vide* adhesive inflammation.

**Fœtus.**—‘The young of an animal in the womb after being perfectly formed.’

**Forensic.**—‘Used in courts or legal proceedings.’

**Fourchette.**—A small transverse fold which is situated at the posterior commissure of the lips of the vagina. It is commonly ruptured in the first delivery.

**Fracture.**—The breaking of a bone.

**Functional.**—*Vide* organic.

**Funis.**—*Vide* umbilical cord.

**Gangrene or Mortification.**—“The mortification of any part of the body signifies its death. When a soft part (not bone or cartilage) is ‘dying’, it is said to be in a state of ‘gangrene’.”

**Gestation.**—Pregnancy.

**Gonorrhœa or Clap.**—A venereal disease characterized by inflammation of discharge from the urethra.

**Goose-skin or Cutis Anserina.**—The peculiar contracted, bristly appearance of the skin, with the hairs standing on ends, produced by cold, by drowning; by tickling or other excitement.

**Granulation.**—‘A process by which minute *grain-like* fleshy bodies are formed on the surface of wounds or ulcers during their healing.’

**Gullet.**—*Vide* Œsophagus.

**Hæmin Crystals.**—‘These are produced by treating a drop of blood, or a watery solution of it, with glacial acetic acid in a watch-glass, and then evaporating the mixture. The dried residue now contains the crystals of hæmin,’ which when examined under the microscope are rhomboidal or tubular in form and yellowish or dirty blood-red in color. To get hæmin crystals from an old blood-stain, a minute quantity of table-salt should be added to the acetic acid solution of the stain.

**Hæmorrhage.**—“A bursting or flowing of blood.”

**Hallucination.**—*Vide* illusion.

**Heart.**—An organ situated in the chest between the lungs. It is conical in shape, with the apex of the cone below and directed to the left, and with the base above and turned to the right. It consists of four chambers (two auricles and two ventricles) and is surrounded by a sac, called the pericardium.

**Hernia.**—‘A protrusion of some organ of the abdomen through an interstice, producing a soft and slightly elastic tumour; a rupture.’

**Hospital Gangrene or Sloughing Phagedæna.**—‘An affection that attacks wounded or injured parts, and chiefly in overcrowded, badly ventilated, or ill-drained hospitals.’

**Humerus.**—The bone of the upper arm.

**Hymen.**—A fold of mucous membrane containing cellular tissue, muscular fibres, blood vessels and nerves, which more or less blocks up the orifice of the vagina in virgins.

**Hyoid bone.**—A horse-shoe shaped bone situated at the upper part of the front of the neck.

**Hypodermic.**—Under the skin. Medicines are said to be administered hypodermically, when they are injected *under the skin* through a hollow needle attached to an instrument, called the hypodermic syringe.

**Hypospadias.**—*Vide* urethra.

**Hypostasis.**—‘The gravitation of the blood in the capillaries after death,’ in obedience to the laws of inert matter.

**Hysteria.**—A nervous disorder, mostly occurring in females, ‘characterized by convulsive struggling, sense of suffocation, drowsiness, and fickleness of temper.’

**Ileum.**—*Vide* pelvis.

**Illusion.**—‘An *illusion* may be defined as an affection of the senses, counterfeit appearances; a *delusion* is an affection of the mind, a chimerical thought: hence we speak of a delusion of the mind, an illusion of the senses. An *hallucination* is a sensation which is supposed by the patient to be produced by external impressions, although no material object acts upon his senses at the time.’

**Impotence.**—‘Inability to propagate, as males.’

**Intercostal.**—Between the ribs.

**Intestines.**—‘The portion of the digestive tract extending from the stomach to the anus. The small intestine, consisting of the

three portions,—the duodenum, the jejunum and the ileum—extends from the stomach to the ileo-cæcal valve (the valve placed between the end of the small intestine and the commencement of the large intestine), and is about 20 feet in length. The large intestine consisting also of three portions—the cæcum, the colon and the rectum—extends from the ileo-cæcal valve to the anus, and is about 5 feet in length.

**In Utero.**—While in the womb.

**Irritant Poisons.**—Poisons which inflame parts with which they come in contact.

**Jaundice or Icterus.**—‘A disease which is characterized by *yellowness* of the eyes, skin, and urine, by loss of appetite and general languor and lassitude.’

**Lactation.**—The period of suckling.

**Larynx.**—The voice-box; the throat; the upper part of the trachea (windpipe).

**Lead.**—*σπινθη*. (Poisonous). *Vide* Tin.

**Leucorrhœa.**—‘The whites’; a condition characterised by a whitish discharge from the orifice of the vagina. The discharge may be of uterine, vaginal or vulval origin. When occurring in young girls as the result of dirt or worms, it is called ‘infantile leucorrhœa.’

**Liver.**—A glandular organ situated on the right side, in the abdomen, under the lower ribs. It is deep-red in color, and secretes a fluid called the bile, which is very essential for the purpose of digestion.

**Lochia.**—From the time of delivery, up to three weeks afterwards, a discharge escapes from the interior of the womb. To this discharge is given the name of *lochia*.

**Lucid interval.**—A temporary cessation of insanity, or a perfect restoration to reason; it is not a remission, in which the symptoms are merely abated.

**Lungs.**—The essential organs of respiration; they are two in number, situated in the cavity of the chest, one on either of the heart. Each lung is covered by an exceedingly thin membrane called the pleura.

**Lymph.**—A yellowish fluid contained in certain vessels called the lymphatics. It has been described as blood *minus* the red corpuscles.



**Meconium.**—The greenish substance made up of bile and the intestinal secretion contained in the intestines of a foetus is known as the meconium. It is thick and tenacious and is voided soon after birth in considerable quantity.

**Mucous Membrane.**—‘At the margins of the apertures of the body, the skin seems to stop, and to be replaced by a layer, which is much redder, more sensitive, bleeds more readily, and which keeps itself continually moist by giving out a more or less tenacious fluid, called *mucus*. Hence, at these apertures, the skin is said to stop, and to be replaced by *mucous membrane*, which lines all those interior cavities, such as the alimentary canal, into which the apertures open.’

**Nœvi Materni.**—Mother-marks; certain congenital, black spots on the body, which are known as luck-marks amongst Hindus.

**Narcotic.**—‘A medicine which induces drowsiness, sleep, or stupor, as opium.’

**Nausea.**—‘Sickness of the stomach, accompanied with a propensity to vomit.’

**Non Compos Mentis.**—Not in sound mind.

**Nux-vomica.**—*नूक्स वमिका*.

**Obstetrician.**—A medical man who assists women in childbirth; an accoucheur.

**Oleander.**—*ओलेण्डर*.

**Opium.**—*ओपियम*.

**Organic.**—‘If a disease is associated with any evident structural change, it is said to be *organic*; if no such can be detected by any method of investigation with which we are at present acquainted, it is called *functional*.’

**Ossification.**—The formation of, or conversion of other substances into bone.

**Os Uteri.**—Mouth of the womb. It opens externally into the vagina.

**Ovaries.**—The ovaries are the bodies in which the ovules are formed and from which they are expelled. They are two in number, and are situated in the female pelvis. Every ovule is contained in a follicle which is known as the Graafian follicle. There are several such ovules in each ovary, in different stages of development. At about the period of menstruation, one Graafian follicle becomes more distended than others and it ruptures, thus giving

exit to the ovule which it contained. Should this ovule happen to get fertilized by a spermatozoon, conception takes place. The rent in the Graafian follicle soon heals up and a scar is left in its place. If conception had taken place, however, a yellow fleshy substance is developed in the follicle which grows to some size, giving rise to the formation of a corpus luteum.

**Ovule.**—The female procreative element.

**Ovum.**—A fertilized ovule ; an egg.

**Pelvis.**—The pelvis is the bony basin situated between the trunk and the lower extremities. It is formed of four bones.' On either side are the *ossa innominata* joined together by the *sacrum*, to the inferior extremity of which the *coccyx* is attached. Each os innominatum is made up of three bones—the ileum (above), the ischium (below), and the pubis (in front)—which remain separated from each other till about the 20th year, when they become ossified. The highest projecting point of the ileum towards its front is known as the *anterior superior spine of the ileum*. The two pubic bones meet together in front, and to this line of union is given the name of the *symphysis pubis*.

**Pericardim.**—*Vide* heart.

**Perinæum.**—The space which separates the orifice of the vagina from that of the rectum. It is about  $1\frac{1}{2}$  inches in breadth.

**Peritonitis.**—Inflammation of the peritoneum, the membrane which partially invests all the organs contained in the abdominal and pelvic cavities.

**Pharynx.**—‘That part of the alimentary canal which is placed behind the nose, mouth and larynx.’

**Placenta.**—‘The organ by which the connection between the fœtus and the mother is maintained, and through which blood reaches the fœtus and is returned to the uterus. It therefore subserves the purposes both of circulation and respiration.’

**Pleura.**—*Vide* lungs.

**Pneumonia.**—Inflammation of the tissue of the lungs.

**Post-mortem.**—After death.

**Priapism.**—‘The more or less morbid and permanent erection of the penis.’

**Pupil.**—‘The apple of the eye ; a small aperture in the centre of the iris for the admission of the rays of light.’

**Purgative.**—‘A medicine that purges or evacuates the intestines.’

**Pus.**—‘The fluid formed in the process of suppuration; the matter of a sore.’

**Pyæmia.**—A form of blood-poisoning, occurring after wounds, characterized by the formation of secondary abscesses.

**Ramus.**—The perpendicular portions of the lower jaw are known as the rami, each portion being called a ramus.

**Rectum.**—*Vide* Intestines.

**Rigor Mortis.**—Cadaveric rigidity; rigidity pertaining to a dead human body.

**Rupture.**—1. Bursting or breaking.

2. Hernia.

**Sacrum.**—The triangular bone which forms the posterior boundary of the pelvis.

**Scalp.**—‘The skin of the top of the head.’

**Scrotum.**—The pouch which contains the testicles and part of the spermatic cords.

**Sebaceous Glands.**—Small glands situated in the substance of the skin and secreting a fatty matter which keeps the skin oily and glossy.

**Seriatim.**—In a series.

**Serum.**—Blood *minus* the blood corpuscles and fibrin elements: the thin fluid which separates from the blood when it coagulates.

**Shin.**—The forepart of the large bone of the leg.

**Spermatazoon.**—The male procreative element. It is contained in the semen. When it fertilizes the ovule (the female procreative element), conception takes place.

**Sterility.**—Barrenness.

**Sternum.**—The breast-bone. It is made up of three pieces, the lowest of which is cartilaginous in structure, and is known as the ensiform or xiphoid appendix.

**Stomach.**—The principal organ of digestion. It is a membranous receptacle, and is the most dilated portion of the alimentary canal. It is situated in the abdomen, and is continuous with the œsophagus above and the duodenum below.

**Stomach-pump.**—An instrument used for the purpose of pumping out the contents of the stomach, as in cases of poisoning.

**Stramonium.**—*மாம்பூசை.*

**Stricture.**—Contraction of any passage of the body.

**Subcutaneous.**—Under the skin.

**Suppuration.**—‘The process of producing or forming pus, as in a wound or abscess.’

**Symphysis pubis.**—*Vide pelvis.*

**Syncope.**—‘An attack in which the circulation and breathing become faint; fainting.’

**Syphilis.**—A constitutional venereal disease.

**Tattoo.**—‘To prick the skin and stain the punctured spots with a colored substance, forming lines and figures on the body.’

**Tendon.**—‘A hard, insensible cord by which a muscle is attached to a bone.’

**Tetanus.**—‘A disease in which the patient is the subject of an uncontrollable spasmodic contraction of all the voluntary muscles of his body.’

**Thorax.**—‘The chest, or that part of the body situated between the neck and the abdomen, which contains and protects the lungs, heart, œsophagus, &c.’

**Thyroid Cartilage.**—The largest cartilage of the larynx. It is V-shaped with the point of V forwards, which is known as the ‘Adam’s apple.’

**Tin.**—*கொள்ளீயம்* (not poisonous). *Vide Lead.* *தகரம்* is iron plate coated with tin.

**Tissue.**—Texture or organization of parts. There are several kinds of tissue in the body, such as the connective tissue, the fibrous tissue, the fatty tissue, the bony tissue, the cartilaginous tissue, &c. &c.

**Trachea.**—The windpipe; a cartilaginous and membranous pipe, continuous with the larynx above and dividing into the bronchi below, through which the air passes into and out of the lungs.

**Tumour.**—‘A swelling; a morbid enlargement of any part of the body.’

**Ulcer.**—When a sore is being formed by the process of ulceration, an ulcer is said to exist.

**Ulceration.**—An inflammatory process by which pus or other fluid is discharged from a sore.

**Umbilical Cord or Navel String or Funis.**—‘The channel of communication between the fœtus and the placenta, being attached to the former at the umbilicus (navel) and to the latter generally near its centre.’ ‘It consists of the coils of two arteries and a single vein, united together by a gelatinous mass.’

**Urethra.**—‘The canal by which the urine is conducted from the bladder and discharged.’ When the orifice opens on the upper surface of the penis, instead of at its tip, the defect is known as epispadia; when it opens on the under surface, as hypospasia.

**Uterus.**—The womb. It is situated in the pelvis between the bladder in front and the rectum behind and has three openings, one below and two above. Below it opens into the vagina. Above it opens into the Fallopian tubes, one on either side, through which the ovules pass from the ovaries to the uterus.

**Vaginal rugæ.**—‘The *vagina* is the canal which forms the communication between the external and internal generative organs, through which the semen passes to reach the uterus, the menses flow, and the fœtus is expelled . . . . . Under ordinary circumstances, especially in the virgin, the walls lie in close contact with each other, and there is strictly speaking no vaginal canal, although they are capable of wide distension, as in copulation, and during the passage of the fœtus . . . . . The mucous lining of the vagina is thrown into numerous folds . . . . . They (the folds or rugæ) are very numerous in the young and unmarried, and greatly increase the sensitive surface of the vagina.’

**Veins.**—Channels, provided with muscular walls and valves, which carry the blood back to the heart.

**Ventricles.**—‘Small cavities in an animal body,’ as the ventricles of the brain or heart.

**Verdigris.**—*செந்நீர்.*

**Vertebra.**—‘The backbone of an animal.’

**Viscera.**—The contents of the abdomen, chest or skull.

**Voluntary muscles.**—The muscles which are capable of being put in action or controlled by the will.

**Vulva.**—‘The external organs of generation in the female are the *mons veneris* (rounded eminence which becomes covered with

hair at the time of puberty), the labia majora and minora (the major and the minor lips), the clitoris (the elongated erectile organ), the meatus urinarius (the urinary opening), and the orifice of the vagina. The term 'vulva' or 'pudendum', as generally applied, includes all these parts."

**Wadding.**—'Material for ramming down above the charge of fire arms.'

## QUESTIONS.

1. In a case of alleged assault, what circumstances would point to the wounds being self-inflicted?

2. Can you decide in all cases where a dead body has been taken out of the water, whether submersion took place during life or after death, and what are your means of diagnosis?

3. Give the symptoms of chronic lead poisoning; and under what circumstances is it liable to occur in this country?

4. What circumstances would enable you to form an opinion as to the homicidal, suicidal and accidental nature of a gunshot wound?

5. What do you understand by strangulation? Describe the post-mortem appearances in a case of death by strangulation; what circumstances would lead you to believe that strangulation was homicidal?

6. What evidences would lead you to infer that a new-born child had breathed before it died?

7. Mention the most important external and internal appearances of death by drowning, giving your opinion as to their relative trustworthiness?

8. How would you decide in a particular case of hanging, whether it was one of homicide or suicide?

9. A man is found dead with his throat cut and four punctured wounds of the abdomen. State the points, which a medical man should attend to, on being shown the body undisturbed from its original position so as to be able to distinguish between a suicidal and a homicidal act.

10. What are the symptoms of dhatura poisoning?

11. Supposing an unmarried woman with abdominal enlargement to be accused of being pregnant, mention the points you would rely on to decide that she is pregnant; and give some other causes to which the enlargement may be due.

12. What are the tests for blood stains, besides the microscopic and spectroscopic examinations?

13. What are the signs of live birth? And how is the age of a foetus to be determined?

14. What are the symptoms of poisoning by *nux-vomica*? And what is the poisonous action of the seeds due to?

15. The corpse of an adult is found in a well. Near the spot is discovered a rope with a noose at one end. There are marks of dragging sufficient to lead to the supposition that the body was pulled along the ground and in the direction of the well. On one side of the neck there is a defined mark corresponding to the strands of the rope. State on what appearances you would rely to decide whether the subject was strangled and thrown into the water, or that drowning was the cause of death.

16. How is death caused by hanging to be distinguished from death caused by suffocation?

17. What do you understand by ecchymosis from violence? What enables you to determine the period during which an ecchymotic patch has existed? Mention any circumstance under which severe violence may cause the death of a person without any ecchymosis or injury to the skin.

18. What are the symptoms of poisoning by antimony? What salt of antimony is commonly used in medicine and for what purpose?

19. Is it possible to distinguish between burns caused before and after death, and if so by what means?

20. What is the hydrostatic lung test? What are the objections raised to it? How would you meet the objections?

21. What is the cause of death in hanging? What are the post-mortem signs of death by hanging?

22. A child is alleged to have died by sucking lucifer matches. What are the post-mortem appearances likely to be seen? What poison should be detected on chemical analyses if the allegation is true?

23. What evidence may be derived from the position, nature and extent of wounds as to their being of a homicidal, suicidal or accidental nature?

24. What are the signs that you would look for in a case where a person is said to have died from profuse bleeding from a wound and where all traces of blood have been washed off?

25. What salts are liable to be mistaken for oxalic acid? What are the symptoms of oxalic acid poisoning?

26. A body being still suspended, you are called in by the police. What points would you note?

27. What are 'dying declarations'? When are they valid? By whom should they be taken?

28. How would you distinguish between cutaneous hypostasis and ecchymosis from violence?

29. Discuss the question of the civil responsibility of the insane.

30. What are the symptoms of poisoning by aconite?

31. Under what circumstances is a drunkard irresponsible for his criminal acts?

32. What are the symptoms and post-mortem appearances of arsenical poisoning? What would be your treatment?

33. What are the organic causes of sterility in the female?

34. Enumerate the different forms of violent death included in the term asphyxia.

35. When may it be necessary to exhume a corpse? What precautions should be taken in such a case?

36. A informs the police that B was committing buggamy on a cow, when he saw B ten minutes before within a temple compound. A constable goes to the place and sees B going out of the temple. The constable takes B to the police station. What steps should the station house officer take in such a case?

37. Can tattoo marks be artificially effaced? If so, how and with what success?

38. What are the signs by which you can affirm that a woman was previously delivered?

39. Criminal abortion is practised on a woman in the fifth month of pregnancy. What are the signs that should be looked for by the medical man, if called to see the woman five days after she had aborted.

40. A person is said to have died of the effects of lightning. Information is given to the police that he has been poisoned. The body is brought to the hospital. There is one punctured wound in the region of the heart, no traces of blood, however, being found about the wound. State clearly all that the medical man is expected to do in this case.



41. Rape is alleged to have been perpetrated on a girl of ten years. There is a whitish discharge from her vagina, and there are several superficial incised wounds on her body. It is said that the whitish discharge from her vagina is due to the accused having transmitted his gonorrhœa to the girl. On examination, it is found that he is suffering from gonorrhœa. The accused entirely denies that he is guilty. What conclusion would you come to about the case and on what grounds?

42. How would you distinguish a wound made during life from one made after death?

43. How is the sex determined from a skeleton? How is the stature ascertained?

44. How would you find out an impostor from a really mad man?

45. What is understood by a lucid interval?

46. A body is found with the throat cut; what circumstances would lead you to believe that the wound was (a) inflicted during life, (b) self-inflicted?

47. Give the symptoms of poisoning by corrosive sublimate. What salts of mercury are commonly used in medicine?

48. What are the post-mortem appearances in cases of poisoning by the mineral acids?

49. What constitutes 'rape' in this country? And from what may medical evidences of the crime be derived?

50. By what means may criminal abortion be effected? and what are the signs of its occurrence?

51. Is *ecchymosis* a necessary or constant result of severe *contusion*? And may death follow such *contusion* without *ecchymosis*?

52. What are the drugs most commonly used in India for purposes of poisoning, and what are the prominent symptoms excited by each?

53. What are the post-mortem appearances that would be present in a case of cobra-bite.

54. Is it possible to produce on the dead body appearances that shall successfully simulate bruises made during life? If not why not?

